THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., JANUARY 21, 1892.

THE WEEK IN IRON CIRCLES.

General Features.

The third week in January ends with no general buying movement on the part of the pig iron consumers. One or two quite large transactions have been closed and there has been a liberal run of small orders all through the Western territory, but there is no disposition on the part of buyers to provide for more than their actual minimum requirements. Speculation is completely wanting. A very little increase on the present rate of consumption, however, would carry it beyond the producing capacity of the furnaces in blast, and the effect would speedily be felt in prices, as practically the full producing capacity of the country is now active, barring only such furnaces as are not in position to run except on considerably higher prices. During the past two weeks a number of large Southern furnaces have blown out for repairs, and stocks on hand are either very low at these furnaces, or sold for early and forward delivery. This will heavily diminish production and affect the market more or less. It is reported that one of the largest Southern companies, operating many stacks, is sold up on foundry grades. Very low prices in coke irons have continued during the week at Louisville, grey forge, basis $9.50 and No. 1 Foundry as low as $11.50 being made for prompt shipment, also sales at $9.75 grey forge deliverable during six months. The prices mentioned are not confined to the smaller furnaces, but one of the largest companies is reported to have sold on this basis. Buyers East are making inquiry for large lots, but are not willing to pay, save for long deliveries, more than $9 75 for grey forge at furnace, and have tried to shade this price, but without success. Car wheel irons continue quiet, prices remaining stationary, first class car wheel irons being offered basis of $15.00 for Nos. 1 and 2, and $16.00 for Nos. 3 and 4. At Chicago a good amount of business is still going on, this being for the most part for coke brands, charcoal being in little demand. Prices remain unchanged. Large consumers who have been carefully watching the situation, take the position that on account of the continued accumulation of stocks, there is no probability of any change during next two or three months. On the other hand consumption is going forward heavily and the outlook promises very heavy melting of iron during the year. While the general advance of prices is not imminent a decided stiffening may come at any time. Business at Detroit has been a little less active the past week than during the previous one, notwithstanding the railroads continue to purchase cars, and the car makers to immediately cover for all contracts taken by by ordering the material needed for their manufacture, including the pig iron. Some orders for Lake Superior charcoal are in prospect but prices continue weak and no immediate change for the better is anticipated. The smaller buyers are still purchasing only as required for immediate use, and the larger ones have orders already placed for the next few months. There has been less call for Southern irons, except for a few special grades, and Ohio irons have also been very quiet Should the expected advance come suddenly, a great many buyers who are waiting for the turn, and relying on their being able to then get in their orders at bottom figures, would be greatly disappointed. The consumption of individual foundries in Buffalo and vicinity still continues far below normal, but owing to the increase in capacity and number, the amount of iron being placed is very satisfactory and quite up to recent expectations. There is not the same noticeable pressure to sell remarked a few weeks ago. In fact some furnaces are sufficiently supplied with orders to be quite independent. The contracts now being placed by some jobbing and architectural foundries indicate a renewal of activities along the line. At St. Louis there seems to be a general inquiry into the market on the part of the consumers, who have been waiting until after the turn of the year, believing that should a change in the condition of prices take place, it would have been about this time, but as there is no indication of iron selling for lower prices, and many things to influence an upward tendency, some heavy orders have been placed recently. The principal feature at Cincinnati is the demand for Ohio Silveries.

Iron Ore.

The ore market is as yet very quiet, notwithstanding the reported sales to the Illinois Steel Company and to the Carnegie furnaces of a large quantity of ore, the total of which can only be guessed at, since the only parties who know, the sellers and the purchasers, decline to confirm or deny any of the rumors that have taken wing since the transaction reached publicity. Some of the dealers put the amount of ore engaged in this way at a million tons, but it may be either one-half, or twice that amount for all that is definitely known. The two concerns named, when running full, consume about three million tons of ore a year, and as this is likely to prove a very busy season, it may not be bad guessing to put them down for that much, which simplifies the remainder of the season's work by just one-third While, as above stated, there is much speculation as to the amount actually sold, the price, by some means, has leaked out, and the news will prove rather agreeable to the furnace interests. The advance on the ore, which was all Bessemer, was thirty-five cents a ton, the result showing that the purchase did not include the highest grades of Bessemer. The general idea as to the increase in price has undergone a considerable modification, the quotations for '92 showing all the way from 25 to 50 cents, according to the quality of the ore. It may be safely assumed, however, that there will be no decrease in price after the opening sales are made, the chances favoring a further advance in the event of a better pig iron trade. Some ore, it is said, has been sold for the Wheeling district, but no figures are available at this end of the line. The fact remains that a great many sales made in that direction have a string tied to them, so that not much importance attaches to the news. The vesselmen have been more than active during the week, more than a million of tonnage being tied up in the way of charters from the head of the lake, at $1.25 for the season. This is thirty-five cents better than the lowest price paid last year, and twenty-five cents better than the season price for '91. The advance is in keeping with the advance in ore, and fairly represents a division of profits. The whalebacks are all in, but enough tonnage is likely to keep out for higher grain charters to make the season interesting, at least for the fore part of the shipping.

Coke.

Coke remains quiet, the combination price of $1.90 still remaining in force, but a great many offers are being received here and in the valley, to furnish any quantity of strictly Connellsville at a considerable reduction, all the way from ten cents to thirty cents below the syndicate price.

Pig Iron.

The pig iron market shows little signs of increased activity, but the feeling in trade circles is rather firm, and the furnace interests are hopeful of the future. Fears are expressed in some quarters that another demand may be made by the furnace help for an advance in wages, preliminary action to that effect being reported from the Pittsburgh district.

Merchant Iron.

Manufactured iron of almost every kind is dull as to the volume of sales.

Scrap Iron.

In the scrap line, old iron rails command from $22 to $22.50, and wrought material brings from $18.50 to $19.

A GOOD YEAR FOR THE COKE SYNDICATES.

Whatever the results of 1891 were to the pig iron trade, it is interesting to learn from the Connellsville (Pa.) *Courier* that, despite the fact that the output of coke in the twelve months just ended was the smallest in the past three years, "the cash returns were better than those of any year in the history of the trade, saving and excepting only the booming year of 1890." This was owing to "the firmness of the leading operators in maintaining prices at $1.90 per ton, the figures set at the beginning of the year."

The aggregate output of the region last year was 4,929,960 tons, which at $1.90 per ton, would represent an income of $9,366,944. Other considerations, which the *Courier* enumerates, make it safe to say that the output of the Connellsville region for 1891 yielded the operators a round $10,000,000. The output of 1890 was over 6,000,000 tons valued at the ovens at nearly $13,000,000. The coke production of the region and the value of the same for the past six years were as follows:

Year.	Tons Made.	Value.
1886	4,109,331	$ 5,876,343
1887	4,396,343	8,413,672
1888	4,971,287	5,965,544
1889	5,825,826	8,156,156
1890	6,221,518	12,903,940
1891	4,929,960	9,366,944

Two-thirds of the output of the region for 1891 was shipped during the last half of the year. The average shipments during this period were slightly greater than those of the corresponding period of 1890, and were up to the average of that year. The trade of the first half of 1891, however, underwent the withering experience of a three months' labor strike which reduced it to a ridiculous minimum. The shipments of February, March, April and May, four months, aggregated less than 32,000 cars. The shipments for last month, alone, exceeded this figure, and those of the dullest month in the year fell only a few thousand cars short of this four months' strike period.

The prices of coke for the past seven years are shown in the following table.

Months.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
January	$1.10	$1.20	$1.50	$1.75	$1.25	$1.75	$1.90
February	1.10	1.35	2.00	1.75	1.25	1.75	1.90
March	1.10	1.35	2.00	1.50	1.25	2.15	1.90
April	1.20	1.35	2.00	1.00	1.15	2.15	1.90
May	1.20	1.50	2.00	1.00	1.10	2.15	1.90
June	1.20	1.50	2.00	1.00	1.10	2.15	1.90
July	1.20	1.50	2.00	1.00	1.00	2.15	1.90
August	1.20	1.50	2.00	1.00	1.00	2.15	1.90
September	1.20	1.50	2.00	1.00	1.35	2.15	1.90
October	1.20	1.50	2.00	1.00	1.50	2.15	1.90
November	1.20	1.50	2.00	1.25	1.75	2.15	1.90
December	1.20	1.50	2.00	1.25	1.75	2.15	1.90

Oven building was pretty active during the year in spite of the dull times. Nearly 1,200 new ovens have been erected, increasing the total ovenage of the region from 16,020 to 17,204.

Of a new coke region which is rapidly coming to the front as a competitor of the Connellsville district the *Manufacturers' Record* of January 2, says: "There has been remarkable progress in the coke industry of the Pocahontas region during the past year. A number of new companies have commenced operations, and there has been a large increase in the number of ovens. On January 1, 1890, the condition of the industry was as follows: Number of ovens completed, 1,765; number of ovens building, 654; number of ovens contemplated, 520. In two years, 540 ovens have been built, and 1,565 are under construction. The number of ovens complete, building and contemplated, at the close of 1891, is as follows: Completed, 2,305, under construction, 1,565; contemplated, 1,978."

HUMORS OF THE DEEP WATER-WAYS MOVEMENT.

We are in receipt of a marked copy of the Toledo *Blade* containing an interesting communication from Mr. Samuel R. Backus, of the Abner L. Backus & Sons Company, a well-known grain and elevator firm of Toledo, to which the editor of the *Blade* adds some suggestive, not to say startling, comments. Mr. Backus' point, in a word, is that the deepening of the navigable channels of the Great Lakes will allow the escape of so much more water than now flows over the rocky "lips" of these great aqueous bodies, as to permanently lower the several lake levels and practically render unnavigable every harbor from Muskegon to Ashtabula. Indeed, the editor of the *Blade* looks ahead several centuries with genuine alarm, and sees Chicago an insignificant inland town, while Milwaukee and every other port on Lakes Michigan, Huron and Erie would be permanently shoaled. Cleveland's break-water would then, no doubt, be simply a relic of the past, and Buffalo would have to content itself with being described as a way station on the Erie Canal. The whole subject would be extremely diverting were it not for the evident sincerity of both Mr. Backus and the editor of the *Blade*. As it is, they are not without a remedy to suggest in the face of this great and impending danger, and the remedy is certainly worth consideration, if the theory is not. It is: first, that vessels be built wider and consequently with less draft, and, secondly, that the Government be asked to keep the lakes open for navigation through the Winter, or at least, through a portion of it. In the meantime, the Committee on Legislation, appointed by the recent Water-ways Convention at Detroit, will not consider itself discharged from further duty in view of these impending calamities.

THE BALANCE SHEET OF THE WORLD'S FAIR.

Figures concerning the status of the World's Fair, brought up to January 1, 1892, are very interesting. Summing up columns of statements and statistics, the following salient features appear:

Thirty-one nations and twenty-four colonies have determined to participate. The aggregate amount thus far appropriated by these intending exhibitors is $4,004,565. Other countries will be added to the list, and the appropriation will be increased to $5,000,000.

The United States Government has appropriated up to date $1,500,000. Twenty-six States and two Territories have made appropriations aggregating $2,695,000, and many will increase their amounts. Nine States are raising over $1,000,000 by private subscription, and it is expected that the total expenditures by the States and Territories will reach $5,000,000.

The great Exposition buildings number thirty, will cover 159.4 acres, and will cost $7,791,000. This amount will be increased to $8,000,000. To the above must be added, for grading, landscape grading, bridges, railways, steam plant, electricity, statuary, water supply, sewerage, organization and administration, and operating expenses, $10,530,453, making the grand sum total to be expended by the Exposition Company, $18,430,453.

The Exposition Company has already expended $2,779,707, and the expenditures are now running about $1,000,000 a month.

The Exposition resources, including prospective gate receipts ($10,000,000), foot up $23,754,682; but as the greater part of this is in the future, immediate aid may be asked of the Govenment to the amount of $5,000,000.

There are 30,000 subscribers, and 500 have died since the subscription books were opened.

Thus far 60 per cent. of the subscribed amounts has been called in, and $3,433,800, or more than 60 per cent., has been actually paid in.

The actual erection of the Exposition buildings began in June, 1891. They will be dedicated on October 12, 1892, the 400th anniversary of the discovery of America by Columbus. The Exposition proper will open on May 1, 1893, and close on October 30th, of the same year. The receipts of goods will begin November 1, 1892, and continue until April 10, 1893.

The applications for space by intending exhibitors in the United States alone numbered 2,082 on January 1. The number at the Philadelphia Centennial for the corresponding date was 864. With the foreign exhibits, it is already assured that they will outnumber those at any previous world's fair.

REFERRING to figures recently published in *The Iron Trade Review* concerning our inland marine, the *Monetary Times*, of Toronto, says: "The most startling fact in the whole of the above statistics is that of the total steam tonnage of the United States, more than one-half was built upon the Fresh Water Lakes. Another very remarkable circumstance is the growth of the shipbuilding on these lakes from 56,000 tons in the year 1887 to 108,000 in 1890, and probably a still larger amount in 1891. The carrying trade of the lakes is one of the most important in the world."

"THE course of prices would, on the whole, have been comparatively steady had it not been for the exceptional speculation in Scotch pig iron warrants," says the London *Economist*, in its annual review of the British pig iron markets. The facts shown demonstrate that the pig iron market abroad was a mere battledore and shuttle-cock in the hands of the London speculators. To the introduction of such vicious manipulation into the United States we are unalterably opposed.

THE Canadian Manufacturers' Association is a nursery for the production of statesmen.—[Canadian Manufacturer.

Are we to understand that our friend, Secretary Cassidey, aspires to the position of nurse?

THE *Canadian Manufacturer* is right in opposing tax exemption for new industries in Toronto. The system is vicious in principle and unjust in practice.

CONDITION OF THE BLAST FURNACES OF THE U. S.

January 1, 1892.

[CONDENSED FROM THE AMERICAN MANUFACTURER.]

LOCATION OF FURNACES.	CHARCOAL. Total No. of Stacks.	In Blast. No.	In Blast. Week'y capacity.	Out of Bl'st. No.	Out of Bl'st. Week'y capacity.	BITUMINOUS OR COKE. Total No. of Stacks.	In Blast. No.	In Blast. Week'y capacity.	Out of Bl'st. No.	Out of Bl'st. Week'y capacity.
New England	13	9	840	4	315	.....	.....	.....	.....	.....
New York	8	3	476	5	66	6	3	3,450	3	2,123
Pennsylvania	14	4	355	10	760	1	0	0	1	600
Upper Susquehanna Valley	.....	.....	.....	.....	.....	24	19	30,031	5	6,817
Pittsburgh	.....	.....	.....	.....	.....	2	2	1,566	0	0
Spiegel	.....	.....	.....	.....	.....	1	1	170	0	0
Allegheny Valley	.....	.....	.....	.....	.....	17	14	12,840	3	1,329
Shenango Valley	.....	.....	.....	.....	.....	3	1	932	2	1,492
Youghiogheny Valley	.....	.....	.....	.....	.....	20	13	7,881	7	3,084
Juniata and Conemaugh Valleys	.....	.....	.....	.....	.....	5	3	2,958	2	2,800
Maryland	8	1	135	7	574	17	12	6,531	5	2,380
Virginia	8	1	49	7	479	1	1	100	0	0
North Carolina	.....	.....	.....	.....	.....	6	3	3,357	3	840
West Virginia	2	0	0	2	130	15	10	9,908	5	5,406
Ohio—Mahoning Valley	.....	.....	.....	.....	.....	17	13	11,594	4	2,543
Eastern, Central and Northern	.....	.....	.....	.....	.....	14	4	1,366	10	2,668
Hocking Valley	.....	.....	.....	.....	.....	13	6	1,419	7	1,757
Hanging Rock	12	5	402	7	633	.....	.....	.....	.....	.....
Miscellaneous	.....	.....	.....	.....	.....	5	2	560	3	1,060
Kentucky	1	1	79	0	0	.....	.....	.....	.....	.....
Hanging Rock	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Western Region and Miscellan'ous	.....	.....	.....	.....	.....	13	10	5,012	3	1,276
Tennessee	6	3	822	3	364	2	1	742	1	645
Georgia	4	2	487	2	224	38	25	17,245	13	7,993
Alabama	14	9	2,357	5	1,681	2	0	0	2	287
Indiana	.....	.....	.....	.....	.....	19	13	17,818	6	9,608
Illinois	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spiegel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	22	10	3 443	12	3,229	4	3	2,731	1	422
Wisconsin	5	4	1,95	1	120	1	1	310	0	0
Minnesota	.....	.....	.....	.....	.....	5	1	842	4	2,534
Missouri	2	1	315	1	325	.....	.....	.....	.....	.....
Texas	4	2	579	2	424	.....	.....	.....	.....	.....
Oregon	1	1	152	0	0	.....	.....	.....	.....	.....
Colorado	.....	.....	.....	.....	.....	2	0	0	2	708
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total charcoal and coke	124	56	12 448	68	9,920	253	161	139,363	92	58,372
Total anthracite	157	93	39,631	64	22,177	.....	.....	.....	.....	.....

SUMMARY.

FUEL.	In Blast. Number.	Month Previous.	Year Previous.	In Blast. Weekly Capacity.	Month Previous.	Year Previous.	Out of Blast. Number.	Month Previous.	Out of Blast. Weekly Capacity.	Month Previous.
Charcoal	56	59	61	12 448	12,753	12.459	68	64	9,920	9,809
Anthracite	93	88	102	39,631	35,592	41 952	64	69	22,177	23,161
Bituminous	161	162	143	139,363	144,664	109,870	92	90	58,372	53,307
Total	310	309	306	191,442	193,009	164,281	224	223	90,469	86,277

Cutting Rails in Equal Lengths.

"Some of those rails are no longer than the others; and the reason of it is that while the gages were set all right, some of the rails were hotter than the others; and those which were the hottest when cut are the shortest when cold, having contracted more than the others, after cutting. In some of the German mills they never have any such trouble; they look at the rail through a dark glass, through which, when they have cooled to a certain temperature, they cannot be seen at all. A dark blue or an orange yellow glass will make a red-hot rail invisible. It may be considered a fact that any two rails looked at through the same pair of glasses will disappear at the same temperature. If every rail is allowed to cool until it is just invisible through a certain pair of glasses, all will be of the same temperature; and their lengths will be the same."

This is one of the lessons that we may learn from our cousins across the water, says the *Engineering Magazine*, but it is doubtful if it is of value when learned so far as American practice is concerned. All mill contracts in this country allow for a variation of one-quarter of an inch, which is found ample. Fancy such plants as the South Chicago Rolling Mills, Carnegie, Phipps & Co., or the Cambria Iron Works working under such a rule as that.—[Railway Review.

An Erie-Ontario Ship Canal.

Senator Davis has introduced a bill for the construction of a ship canal around Niagara Falls, in the State of New York, for the passage of merchant and war ships from Lake Ontario to Lake Erie. The canal is to be located in Niagara County, along one of the routes for a ship canal heretofore surveyed by the United States, if either of such routes be deemed feasible. The canal is to be of sufficient width, depth and capacity to easily, safely and expeditiously float vessels of as great length, width, draught and tonnage as can be floated through the St. Mary's Falls Canal and locks when the latter are completed. In case none of the routes already surveyed are found feasible, the Secretary is to cause surveys, plans and estimates to be made for such canal along some other route. The sum of $1,000,000 is appropriated to be applied to the construction of the canal.

An Alaska Railway.

The *Engineering News* says: "An Alaska railway is the subject of a bill presented to the United States Senate by Senator Stewart. The bill grants permission to the Alaska Mining & Development Co. to build a railway from Portage bay on the Behring sea, with grants of government land for right of way and terminals. The mining and shipping of coal seems to be the main object of the enterprise."

SPIRIT OF THE TRADE PRESS.

THE POINT OF VIEW IN BUSINESS.

Americans Using American Cutlery.

Official figures, just issued, show that the value of cutlery exported from Sheffield to the United States during last year was less than half the value of that exported during the preceding year. In the meantime the people of this country are using cutlery and that to a larger extent than ever before. Here would seem to be an instance where protection is stimulating home production. It may be added that the price of cutlery has not advanced in consequence.—[Chicago Journal of Commerce.

Our Enormous Consumption of Metals.

Statistics of the year just closed show immense increase in the production of most of the metals. The consumption of metals has increased steadily in accord with the growth of the country in wealth and population. Almost the only article which has fallen off has been steel rails, and with it pig iron. In this instance the financial condition of the railroads was the cause, while where consumption is made up of the purchases, in small and various forms by the people at large, it steadily increases unless checked by very high prices. The consumption of metals ten years hence will evidently be so large, as compared with the present immense increase over ten years ago, that the figures, were they get at able, would makes one's hair stand on ends in wonder and surprise.—[National Labor Tribune, Pittsburgh.

The Structural Iron Combination Menaced.

From present appearances the importers of beams would seem to be skating on thin ice if they are investing in large stocks of beams to be carried in this country. They are, of course, proceeding on the assumption that present prices will be maintained by the manufacturers. This may or may not be the case, and all predictions are hazardous. But there has perhaps never been a time since the combination was established when its existence seemed to be so imperiled. The importation of beams itself is a disquieting feature, and the greater it grows the worse it becomes and the more likely it is to cause a drop in prices. * * * The situation is one which will bear close watching. If car truck channels can be sold in the West at 2 cents per pound, what is to prevent beams from dropping to the same price, or nearly to it, if the members of the combination think their own interests would be best served by the reduction?—[Iron Age, New York.

Iron and Steel and the Implement Trade.

The annual reviews of the iron and steel trade show that the requirements of implement manufacturers are an important factor in determining the course of the steel market. It is found that these manufacturers consumed greater quantities of steel during 1891 than in 1890, and this fact furnishes additional evidence to support the statements that were made during the past year in regard to the heavy demand for implements, especially in view of the fact that considerable quantities of goods had been carried over from 1890. Implement men who experienced a dull and backward trade during 1890 may find it difficult at first thought to understand the statements of the steel men that "contracts were so large as to attract attention in all quarters." One explanation is that steel was used more largely in place of wood during 1890 than previously in harvesters and other implements, and besides, manufacturers were obliged to make up their stock of goods as usual, the dullness of trade being occasioned by the inability to dispose of the finished product.—[Farm Implement News, Chicago.

Good-bye to the Steel Nail.

We have had occasion several times in the past, in these columns, to refer to the struggle for existence between the wire and steel nail, and to note the various stages of the conflict. The events of last year have proved pretty conclusively that the end is not far distant, and that in the language of the day the wire nail is "a stayer," and is pretty sure to win. * * * It will not be a pleasant matter to write the obituary of a once extensive and flourishing business, employing thousands of men and millions of dollars of capital, and seeming as securely established as any business enterprise in existence. —[Age of Steel, St. Louis.

When it is borne in mind that wire nails were boomed into prominence on account of certain claims which have not yet been settled beyond doubt, and that repeated tests have proved that where a good, strong, tenacious grip is required, as in structural work, for instance, the superiority of steel nails is no longer a matter of dispute, the question is a step nearer solution. In temporary work, such as light boxing and packing, where only a small amount of tenacity is required, and ease of driving is a consideration, the wire nail may continue to share honors with the steel. While it is true that the cut nail trade is now depressed, the wire nail business is in no better condition. And further, the superiority of steel nails in general utility renders it probable that that branch of the nail industry is likely to regain a good deal of its old-time supremacy, and that several moons will wax and wane before the birth of the singer who shall chant the death song of the steel nail.—[Ohio Valley Manufacturer, Wheeling, W. Va.

An Early Estimate of '91's Pig Iron Output.

We estimate the total production of pig iron in the United States during the year 1891 at 8,196,127 gross tons. * * * The production of the past year, as compared with that of 1890, shows a falling off of 1,006,576 gross tons, the total production of 1890 having been 9 202,703 gross tons. This was caused mainly by the stoppage of the Mahoning and Shenango furnaces for several months in the early part of the year. In the first six months of 1891 the production was 3,371,925 gross tons against 4 560,513 gross tons in the first half of 1890, a decrease of 1,188 588 gross tons or 26 per cent. An estimate places the production of pig iron in the last six months of 1891 at 4,824,202 gross tons, an increase of 1 453 277 gross tons, compared with the production the first half of the year. The production in 1890 showed an increase of more

than 21 per cent. over that of the year previous, but the output of the year 1891, as compared with that of 1890, shows a falling off of a little over ten per cent.—[American Manufacturer, Pittsburgh.

Chicago's Trade in 1891.

The trade of Chicago showed activity throughout 1891. The *Farmers' Review* says "the order of 1890 was reversed in that the last half of the year was distinguished by buoyancy following comparative dullness in the first six months. Good crops and enhanced values have made an unusually good showing for the year." The following is an approximation by the Chicago *Tribune* to the total value of Chicago's trade during 1891:

Produce trade	$497,000,000
Wholesale	517,200,000
Manufactures	567,012,000
Total	$1,581,000,000

These three departments, however, overlap each other, especially the last two, as material manufactured there is sold at wholesale by the manufacturer. Following up the same plan as in former years in estimating this doubling up, there should be deducted from the above $122,000,000. The statement then stands as follows:

Total trade, 1891	$1,459,000,000
Total trade, 1890	1,380,000,000
Increase	$79,000,000

Some Features of the Money Market.

There is some plethora of currency in the money market, but there is no want of loanable capital. On the contrary, large amounts of unemployed balances, seeking investment, are rapidly accumulating from foreign, as well as from home sources of supply. Hence the absorption of floating capital and the effects on the money market produced by its conversion into fixed forms by railroad building and other useful works, is now attracting less attention than in some previous years. The large amount of capital lost in the failures of last year, attracts for the same reason very little discussion in connection with the money market. An exception for obvious reasons is made for the severe losses of the year by fire, which have led to changes in some of the weaker insurance companies, and to the consolidation of others with stronger organizations aided by more adequate capital subscribed by foreign or American capitalists. These changes are some of them regretted, while others are eminently advantageous, but all will probably tend to strengthen the money market.—[American Banker, New York.

Nearly 100,000 Freight Cars Built in 1891.

A year ago we reported 98 074 freight cars built by private works in 1890. Later figures brought the total up to 103,774 freight cars as the output of all works outside of railroad companies' shops. The returns received for 1891 now give 95 514 freight cars built by private works last year. From these figures the falling off appears to have been a little less than eight per cent.; if full returns could be got this might be changed somewhat. * * * The net increase in freight cars for several years has been, according to Poor's Manual, as follows:

1890	10,801	1886	40,395
1889	46,054	1885	7,120
1888	54,239	1884	19,736
1887	104,973	1883	48,212

Average for 8 years, 41,440.

The total freight cars in the United States at the end of 1890 was, by Poor, 1 061.970. It is quite impossible to make any close estimate of the number of those built in any one year which have gone to fill vacant numbers; but 1,100,000 is a convenient round number to remember, and is probably not far from the total in service at the end of 1891.—[Railroad Gazette, New York.

RECENT BIG THINGS IN MACHINERY.

Heavy Forgings by Cleveland Works.

Writing of the Cleveland City Forge & Iron Co., a correspondent of the *Railroad Gazette* (New York) says: This company forged the large shaft for the steamer "Pilgrim," of the Fall River line, which was about 40 feet in length and 27 inches in diameter, weighing about 40 tons. This is not, however, as heavy as the shafts for the "Puritan" of the same line made here several years ago, which were 30½ inches in diameter, but not quite as long. In turning up these shafts from end to end, the lathe used was of necessity one of heavy build, and with the tail stock moved out to nearly the limit, the weight of the shaft being partially taken between end supports. Among other large work done here of late has been a "beam strap" for a Sound steamer, nearly 37 feet long, 16½ inches wide and weighing between 18 and 19 tons; and the rudder frame for Cruiser No. 2, "New York," which was over three feet thick at the widest portion and having a stock 18½ inches in diameter, was quite a marvel in its way. The other proportions were in harmony with those given, and the whole weighed nearly 14 tons. The contracts were also taken here for rudders for cruisers Nos. 12 and 13, and battleships Nos. 1 and 2, the first two weighing about 15 tons each.

Freak of a 17,500-Pound Casting.

A steel casting weighing 17,500 pounds was lost on December 12, under peculiar circumstances, and found a few days ago and finally sent to its proper destination. Robert Wetherell & Co., of Chester, Pa., turned out and shipped to the Edgar Thomson Works, at Braddock, a plunger for an hydraulic cylinder 16 feet long, weighing 17,500 pounds. The casting was loaded on a gondola car and left Chester in good shape. The next morning when the train stopped at Braddock to deliver it, the conductor noticed that the car was empty. The entire crew were surprised and were unable to explain how the casting escaped for the car was in no manner injured nor as much as scratched. A tracer was sent along the road, but the casting could not be found, and Carnegie, Phipps & Co. ordered another one to be made. Several days later some of the railroad employes, while walking near Columbia, Lancaster county discovered a black speck in the Susquehanna river. Upon investigation it was found to be the lost plunger. How a casting of that size could have unloaded itself without wrecking the train or even injuring the car is remarkable.—[Railway Review, Chicago.

Heavy Tools for Bending Rolls.

Three of our great machine tool-making firms have been constructing large bending rollers for plates. The first machine was made by the Niles Tool Works, for Mare Island Navy Yard, and since then Messrs. Bement, Miles & Co., and William Sellers & Co., both of Philadelphia, have made similar or larger machines. What the relative merits of design may be are not easy to discern, unless one is familiar with some particular work to which the machines are to be applied, but it is safe to claim that in all these cases the plans are commendable and good. The machine made by Messrs. Bement, Miles & Co., for the Newport News Co., weighs in all 150 tons, and receives plates 1¼ inches thick by 15 feet wide, or long, all motions being by means of attached steam engines forming an integral part of the machine. The machine made by Messrs. William Sellers & Co., was for the Boston Navy Yard, and judging from the diameter of the rollers, is the heaviest of the three.—[Industry, San Francisco.

POINTS ON MECHANICAL SAFETY.

The Rage for High Buildings.

New York is to have a twelve-story building, all of steel and iron, with glass and steel front. It will be something new in house construction. Chicago is the first city to introduce house construction innovations in this direction, but this New York structure is a stride ahead even of Chicago, which is the great-go-ahead city of the world. The Pittsburgh *Times* has now under construction what may be called a semi-public building—so designated with reference to where the cost is drawn from—which follows the Chicago style in that the frame is a lace-work of steel so strongly put together that building and contents would stand without the outer walls. The side walls are of brick, and so thin, as compared with the ordinary walls of an eight-story house, that floor space equal to a room 20x100 feet is saved. This new style of architecture is meeting with so great favor that the structural shapes mills will continue to grow in number and importance of output.—[National Labor Tribune, Pittsburgh.

Big Fly-Wheels Give Way.

Four large fly-wheels have given way during a period of four weeks, which, to say the least, is a coincidence. One at Chattanooga, Tenn; one at Cincinnati, O.; one at Greenville, Pa.; winding up with another at Manchester, N. H., where three persons were killed. It is not necessary to go into descriptions of the wheels, or the circumstances of their failure, further than to say that in each case the rules respecting cast iron fly-wheels were violated, although it is not clear, or even probable, that fracture arose from over-strain on the rims. A good rule is to divide 1,500 by the diameter in feet for the number of revolutions such wheels can safely run, provided the "fastenings" are equal to the tensile value of the rims, and the rims have a symmetrical section. There is also the problem of quality in the metal, but the fact is, the limit is a commercial one, and makers drive wheels as fast as they dare, to save weight and cost of iron.—[Industry, San Francisco.

Is It Safe to Connect Boilers in Battery?

Is it safe to connect boilers in battery? By the series of catastrophes we have had recently in this type of generators many will be led to believe that the practice is opposed to good mechanics. This, however, is not the case, at least where the construction, boilers and connections, are scientifically put together and during steam making in charge of experienced engineers. Yet, even under these circumstances disaster seems just now to be unusually rife. There have been five such explosions within a few days, to wit, at the Braddock Wire Works, Pittsburgh, Pa.; the Warren Springer Works, Chicago, Ill. the Fort Madison, Ia., Paper Co.'s Works; the Kreinheder & Fleirl Planing Mill, Buffalo, N. Y.; the Iron & Nail Co.'s Works, Hollidaysburg, Pa.—[Safety Valve, New York.

FOREIGN NOTES AND COMMENTS.

A Great Trade League.

Writing from the Free Trade standpoint, the *Hardware Trade Journal* (Birmingham, Eng.) says: A very momentous event, indeed, is the huge scheme for the readjustment of tariffs upon "mutual terms" which is now in course of ratification between Germany, Austria, Italy, Switzerland, Belgium, and Servia, and to which other nations are expected to give their ultimate adherence. The protectionist principles rampant in France have provoked reprisals, which are at the same time a reply to the Cronstadt demonstration. It would certainly seem difficult to devise a more effective method of strengthening the Triple Alliance than the breaking down to a large extent of the barrier which have hitherto retarded the free and friendly commercial intercourse that brings alliance of peoples as well as of potentates. England, standing as she does upon the "most favoured nation" terms with the chief powers concerned in this new arrangement, will probably participate in any benefits which it may bring. France, it is true, will nominally enjoy the same advantage; but as the greater isolation of France is directly aimed at, this contingency would frustrate one of the prime objects of the scheme, the principal promoters of which will, therefore, gain their object probably by accepting from the general reduction in tariffs such articles as have hitherto formed the staple of French exports to Central European States.

Flexible Metallic Tubing.

A new flexible tubing, which is made entirely of metal disposed in a very ingenious manner, has been lately invented. The tubes are produced by a machine from strips of metal of the required length, width, and thickness. These strips, in passing through the machine, are corrugated longitudinally

with a large and a small corrugation side by side. The tube is formed by the corrugated strip being coiled spirally round a mandrel in such a way that the small corrugation enters and interlocks with the large one, and forms what is known as a piston joint. Formerly this kind of flexible tubing was made steam and water-tight by means of a strip of india rubber inserted in the interlocking corrugations. This tubing answered well for many purposes, but in some cases the substances passed through caused the india rubber to deteriorate. The new form offers a long-sought solution of the problem of the manufacture of flexible metallic tubing unaffected by the passage of any ordinary liquids or gases. In one case a 35-foot length of one inch internal diameter tube was tested under steam at 50 pound pressure per square inch. The same tube was afterwards tested under hydraulic pressure at 800 pounds per square inch. Another piece of tubing half-an-inch in internal diameter was tested up to a little over one ton per square inch, when it burst. The tubes are at present manufactured from 5-16 inch to three inches internal diameter, but machinery is being put up for turning out tubes up to twelve inches diameter, and capable of standing higher pressures than at present.—[Hardware Trade Journal.

The Theory of Puddling.

At a recent meeting of the South Staffordshire Institute of Iron and Steel Works Managers, Mr. Thomas Turner (lecturer on metallurgy, Mason College, Birmingham) read a paper on "The Theory of Puddling." After a lengthy exposition of methods, Mr. Turner concluded by stating that the consideration laid before the meeting showed that, with a pig iron containing one per cent. of silicon, and seven heats per turn, the same result, so far as loss was concerned, was obtained as with about 2.3 per cent. of silicon and only six heats per turn. That pointed out the direction of greatest production in puddling—namely, to use a pig sufficiently rich in phosphorus, carbon, etc., and to puddle in the shortest time. The first condition ensured the reduction of much iron from the cinder, whilst the second prevented waste by oxidation. Practically, to get a good yield there was a choice of a pig low in silicon with quick working or the use of one like the following: Silicon 2 3, phosphorus 1.5, manganese 0 6, with carbon as high and sulphur as low as possible. With careful conduct the yield would be practically the same. The first saved labor and fettling and the other allows the use of a cheaper pig. The loss in making puddled bar might be obviated to a great extent, and a good manager could, by effecting a saving, provide his own salary and confer a benefit on the district.—[Colliery Guardian, London.

THREE WELL PUT IDEAS.

Copying Machine Designs.

The practice of copying machine designs is one that always interests machinery men in one way or another, and the question presents many phases, whether looked at from the standpoint of the one whose designs are systematically and regularly appropriated, or from the standpoint of him who is always looking out for an opportunity to see what can be appropriated without running counter to the laws enacted to protect patent rights. * * * The gist of the whole matter is found in the fact that the work done by an inferior and unintelligent workman is inferior work, while that done by a superior workman is superior work. A first-class design, if exactly reproduced, is still a first-class design—the product of a first-class man. Any change whatever made in this design by an inferior man will inevitably be inferior to the rest of the design, simply because that portion of the design will be the product of an inferior man.—[American Machinist, New York.

The Modern Moloch, Overwork.

The butcher's shop is closed, and Moloch is out of business. The modern man is no longer served on a gridiron or a plate to a cannibal god. We are, however, doing some occasional whittling on the old block. In a refined and conventional fashion we are offering sacrifices of time, health and mentality to a modern Moloch. This last and improved edition of the man-eater is Overwork. We live in a rapid age. The clock is too slow, and the days too short. We spread a mile of life on a yard of time, and by burning the business candle at both ends, the light goes out in the middle instead of at the bottom. Business is a race horse seldom in the paddock, but mostly on the track. Everything moves under the spur and whip. No nation in the world is covering ground as quick, and in no other can we find such a list of overworked, exhausted and disabled men. This fact has been overlooked. In the totals of progress we have forgotten the invoices of human life. The commercial and industrial structure is immense and magnificent. We spread printer's ink in statistical Te Deums, and are patriotically proud of our national supremacy. But under the superstructure is a catacomb, and on the back page of business statistics an extended list of lunatics and invalids, and a growing pile of undertakers' bills.—[Age of Steel, St. Louis.

A Permanent Tariff Commission.

Prof. Robert H. Thurston, of Cornell University, suggests in *Cassier's Magazine* a permanent tariff commission. He says: The real problem, therefore, of the political economist, of the statesman, of the citizen, is to find methods and means of securing the most thorough establishment and most complete intermingling and most extended diversification of domestic industries. That great thinker, John Stuart Mill, has said most truly, "The only case in which, on mere principles of political economy, protecting duties can be feasible is where they are imposed temporarily (especially in a young and rising nation) in hopes of naturalizing a foreign industry, in itself perfectly suitable to the circumstances of the country. He adds, "But the protection should be confined to cases in which there is good ground for assurance that the industry which it fosters will be able after a time to dispense with it." This is undoubtedly the rule; but no nation can ever afford to leave its essential industries at the mercy of foreign competition, until the advantage is at least fairly balanced. The natural and wise method of holding the protection is to keep it up until it simply, in the natural progress of events, becomes evidently entirely needless, or to so arrange the tariff system that a constant supervision may be kept over all its workings and the rates continually adjusted to the requirements of the day in such manner that large imports may be excluded in times of ordinary normal business operation, thus making the barrier one of such height that abnormal monopoly within the lines, resulting in abnormally high prices, may be at once met by the action of foreign competition and at once held down to the natural and desirable condition of the market.

AUSTRALIAN CHEESE MINES.

The Melbourne *Journal of Commerce* for a long time has watched with a jealous eye the splendid growth of American institutions. It has known all along that the United States led all other countries in the richness and variety of its mineral deposits and that New York had, in the *Engineering and Mining Journal*, the best mining paper in the world. We can not blame our esteemed contemporary for feeling envious; it is a very natural feeling indeed.

Despairing of success in a legitimate manner, our contemporary comes out with a tale of recently discovered mineral riches of a startlingly unique kind. In a late issue it states that a farmer, whilst digging a well, struck a vein of natural cheese 3½ feet thick, at a depth of 80 feet. An analytical chemist (presumably of Australian birth and education) has declared it to be cheese of a very high grade. It is said to be "of a beautiful golden colour [with an 'u'], and will keep any length of time."

Such are the very meager details furnished by the *Journal of Commerce*. We regret that our contemporary fails to tell us whether the farmer has since signed the pledge, and whether, since the shaft struck the vein, the people of the neighborhood have been obliged to go about holding their noses in one hand and waving away the smell with the other. The *Journal* likewise neglects to enlighten us as to the character of the ore; it does not state whether it is Limburgerite. Brie blende, Stiltonite, Parmesanite (an amorphous mineral much used as a flux in the reduction of refractory maccaroni), or which of the other known varieties. It also forgets to tell us the assay value of the cheese and its gastronomic desirability. The cheese may be good enough for Antipodean palates, and yet be rejected scornfully by New York free lunch fiends.

Howbeit, it is not to be expected that our contemporary should attain to the literary excellence, thoroughness of information and abundance of technical details which are displayed in the mining news of the "best mining paper in the world." We do not ask the impossible, but we had not looked for so amateurish a way of reporting so grand and georgeous a discovery, and we advise our readers not to invest in any company which may be formed to exploit it until the *Journal of Commerce* has answered fully and satisfactorily the following questions:

1. (*a*) Is the farmer a cheese-mining engineer of repute? (*b*) What is a fair average discount to be made on Australian reports of bonanza "finds?"

2. (*a*) Is the analyst a competent judge of Welsh rarebits?

3. Is the cheese impenetrable? (If so, the demand from boarding houses and restaurants insures for it a ready sale.)

4. Can a man smell this cheese and survive? (If not, give the distance at which a sniff may be taken with comparative safety.)

5. (*a*) Is it combustible, and (*b*) if so, could the fumes be used successfully in the slaughter of Jersey mosquitoes?

6. At what depth do the Australian engineers think that the source of the deposit, that is, the cow, will be struck?

If the discovery be confirmed, it will no doubt prove of incalculable value to Australia. There is a tone of quiet exultation throughout the *Journal of Commerce* article which lends credit to it, but we cannot ignore the well established reputation these colonists have for losing sight of facts when descanting on the resources of their little world. We do not wish to dampen their natural and patriotic enthusiasm, but we are above all conservative and opposed to all kinds of wild "booming." We must, however, say that if a cheese mine had been discovered in this country the very next day would have seen shafts on adjoining locations, some of which would undoubtedly have found a pocket of crackers; and since nature in this country has rounded off her blessings with a regard to the eternal fitness of things there would certainly have been struck in the immediate vicinity a never failing artesian source of ice cold lager beer. That is the way things are done in this country, and even our ineradicable modesty cannot overcome our sense of duty in stating the fact.—[Engineering and Mining Journal.

Iron in Bolivia.

At present Bolivia possesses only one industry, that of mining, and this constitutes the most considerable part of the wealth of the country. Such a form of wealth is of the greatest value in the future development of a new state, since it affords a basis that will allow of rapid and even phenomenal progress, without incurring the danger of the financial crises that have of recent years become such an apparently indispensible factor in the political economy of South America. In view of the importance of metalliferous mining, the industries which might have the greatest chance of success in Bolivia would probably be those that treat the raw metal and convert it into an article of commercial utility. At present the mining industry at Bolivia is suffering keenly from the impossibility of working the mines at a profit; this difficulty, which arises from the cost of transporting the ore, would be overcome if refineries were erected in the country, and a considerable stimulus would at once be given to this important industry. Naturally, the mines would afford also plenty of work for foundries, and a further extension would be given to the establishment of iron works. An excellent site for such iron works is stated by competent authorities to be at Ceruro, or at Potosi. Works for boiler making, lock making and nail making would also find an admirable opening.

FUEL GAS PROGRESS.

THE AMERICAN OIL GAS MACHINE.

The American oil gas machine was designed to accomplish the process of charging air with atomized liquid hydro-carbon in definite proportions, and under such conditions as will secure as intimate a combination of both, and thus produce a fuel gas that will not disintegrate when stored in a "holder" or in the conducting pipes, but will remain a homogeneous and "fixed" gas. The feasibility of devising an apparatus for this purpose was suggested by the following considerations:

1. Air will carry a certain amount of water and hold it in suspension (as moisture), which becomes visible as mist or clouds when present in larger proportion.

2. The specific gravity of oil being less than that of water, the air, can carry a larger proportion of it.

3. The evaporation of liquids is rapid in proportion to the height of temperature to which they are subjected, and their vapors condense under reverse conditions.

4. If then, that proportion of any liquid which the air can absorb and carry at a certain temperature, is ascertained, air charged with that ascertained proportion of evaporized liquid, will hold it in suspension, provided the temperature is not lowered, and if subjected to a higher temperature, the combination becomes more intimate.

5. Compressed air will not readily absorb liquids, but rather repels them in proportion to the pressure applied, but, whatever proportionate amount of liquid can be absorbed by the air under a certain pressure, will be readily held in suspension when that pressure is removed or lessened.

6. The expulsion of moisture, that is water from the air, will increase its affinity for vaporized oil.

These facts lead the inventors to believe in the practibility of devising an apparatus which would produce a practical fixed oil gas by purely mechanical action, and their machine has abundantly proven the correctness of the theory upon which they undertook its construction. The apparatus charges the air with that definite proportion of atomized oil which it will firmly hold in suspension, for an indefinite time, and under all ordinary changes of temperature. The combination, formed under the most unfavorable conditions of pressure, and low temperature, is then partly released from these conditions and allowed to expand under higher temperature, and the result is a perfectly homogeneous and permanent mixture, answering every purpose of a fixed gas.

In proof that their machine accomplishes this process perfectly they point to an experience of nine months, during which time they have stored the gas produce by it in their gas holder, and in the piping of their factory at Elizabeth, N. J., as also in an adjoining private dwelling, and no trace of condensation has been detected anywhere.

Our illustration and description of this apparatus are taken from the patent papers issued to Edward P. Reichhelm, and George Machlet, Jr., of Elizabeth, N. J., December 8, 1891. They say:

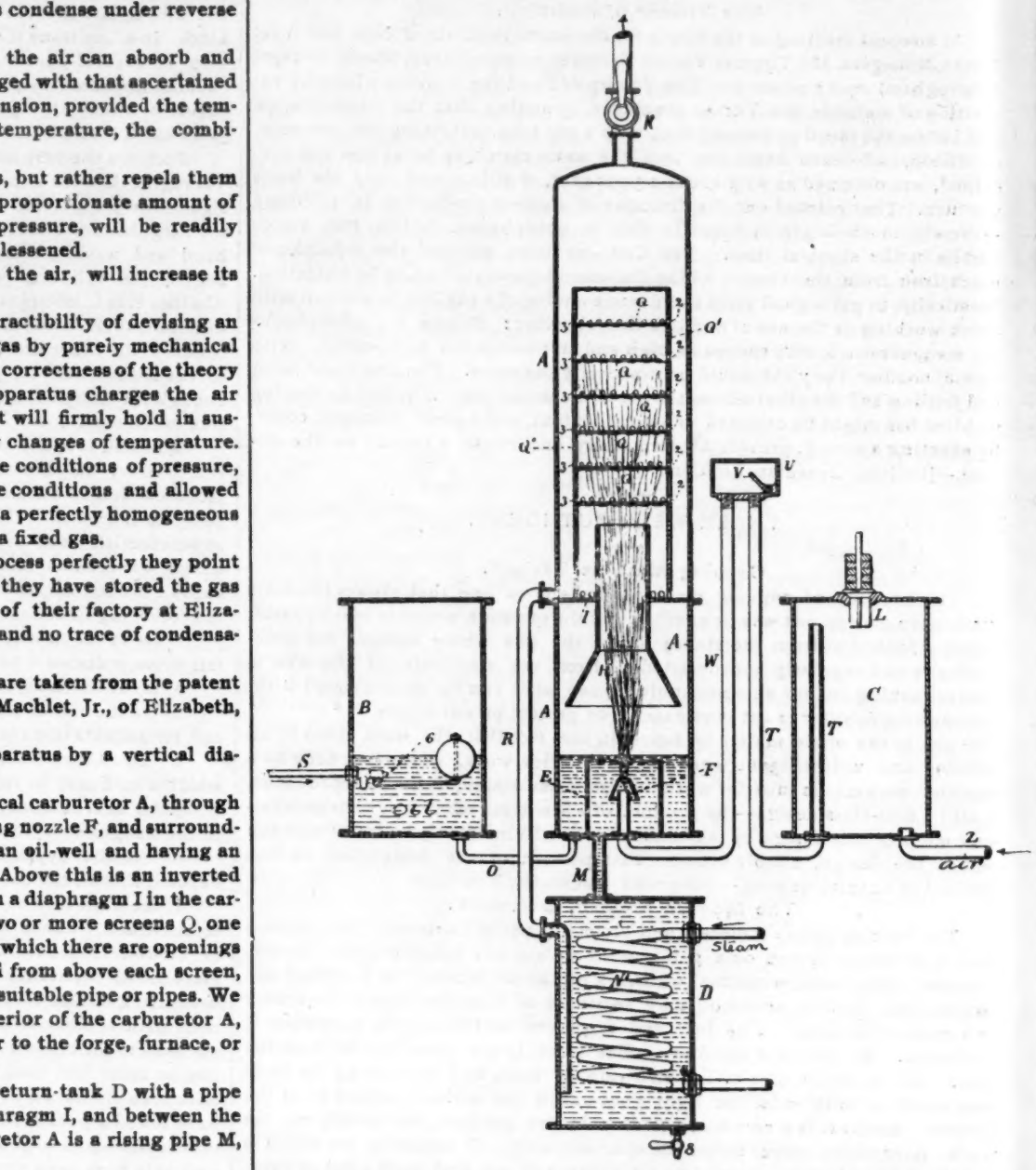
"In the drawing we have represented this apparatus by a vertical diagrammatic section.

"The principal vessel made use of by us is a vertical carburetor A, through the bottom of which rises an air-pipe with an atomizing nozzle F, and surrounding this nozzle is a stationary cylinder E, forming an oil-well and having an upper end of wire gauze or fine perforated metal. Above this is an inverted funnel H, the tubular portion of which passes through a diaphragm I in the carburetor A, and above this inverted funnel there are two or more screens Q, one above the other, supported, preferably, by a case Q′, in which there are openings at 2 3 for the free passage of the carbonaceous liquid from above each screen, which liquid passes back to the oil-well E through any suitable pipe or pipes. We have shown a space between the case Q′ and the interior of the carburetor A, and also a pipe K leading to a suitable gas-holder or to the forge, furnace, or other apparatus in which the gases are to be burned.

"Below the carburetor A we have represented a return-tank D with a pipe R, leading from the carburetor A above the diaphragm I, and between the top of the holder D and the bottom of the carburetor A is a rising pipe M, opening at its upper end within the oil-well E.

"Gasoline or similar hydrocarbon is supplied to the feeding-tank B by a pipe S, and it is maintained at the proper level by a float or ball valve 6, and there is a pipe O leading from the bottom of the feeding-tank B to the bottom of the carburetor A, but such pipe opens outside of the oil-well E, and the level of the liquid in the feeding-tank B is to be such that the liquid in the carburetor A will rise a little above the top edge of the oil-well E, the return tank D at this time being full, and it will now be understood that atmospheric air under a suitable pressure is supplied through the pipe W, and issues by the atomizer F and a column of spray is sent forcibly up through the inverted funnel H and through the screens Q, and the liquid runs from the upper surfaces of the screens Q through the openings 2 3 and pipe R to the bottom of the tank D, and thence rises into the oil-well E, and the circulation of the liquid is maintained with a rapidity proportionate to the pressure of atmosphere passing through the atomizer F, and it will be apparent that the diaphragm I prevents the direct return of any liquid to the bottom of the carburetor A and causes the same to run by the pipe R, preferably into the tank D, so as to rise from such holder into the oil-well E, and there will not be any circulation through the feeding-tank B; but whenever the level of liquid in the apparatus descends sufficiently to open the float-valve 6 the gasoline or similar liquid hydrocarbon runs into the apparatus sufficiently to maintain a nearly uniform level of the liquid. The pipe R might be connected directly to the pipe M, but it is preferable to use the holder D; and the return pipes or passages might be within the carburetor A instead of passing outside the same.

"We have found that in cases where there was not a free delivery of the liquid that is blown through the screens Q such liquid accumulating upon the screens interferes with the circulation or flow of the atmospheric air; but when the liquid is allowed to run freely from the upper surfaces of such screens by the return-passages these screens obstruct the movement of the air but little, and the screens being constantly wet with the liquid hydrocarbon the atmosphere becomes fully saturated with the gaseous vapors before passing off by the pipe K, and we have also discovered that the atmosphere issuing under a pressure from the atomizer F expands, and the apparatus becomes cold. Hence the saturation of the air with the hydrocarbon vapors is almost always at a lower temperature than the gas in the holder or in the pipes, and there is little or no risk of the hydrocarbon vapors condensing into liquid after passing out of the apparatus, and to such an extent is the cold developed by the expansion of the atmosphere and the vaporizing of the gasoline that moisture in the atmosphere becomes frozen, and sometimes obstructs the screens where the apparatus, as a whole, is allowed to become too cold. To prevent this difficulty we introduce into the return-tank D a coil of pipe N′, through which is caused to circulate steam or hot air sufficient to melt any particles of vapor that may be condensed from the atmosphere, and cause such moisture to



subside into the bottom of the return-tank D, and the same is drawn off by a cock or valve 8, from time to time; but it is advantageous not to apply by the coil N′ more heat than is necessary to prevent the formation of particles of ice.

"In consequence of the rapid circulation of the liquid hydrocarbon within the vessel, the whole of such liquid is exposed equally to the action of the atmosphere, and such hydrocarbon is converted into vapor with uniformity, and the burning gas produced can be depended upon for uniformity in its heating properties, and we remark that the air and vapors passing upwardly through the screens tend to raise up and cause to flow away the liquid that rests upon such screens. Hence there is but little resistance to the air and atomized vapor, and the upper screens in the range are comparatively free from the liquid hydrocarbon, such liquid being deposited on the lower screens. After passing the top screen the air expands slightly because the pressure is less. Hence its capacity for holding the hydrocarbon vapors is augmented, and a practically permanent gas is formed, especially under the subsequent increase in the temperature of such gas.

"Any suitable blowing apparatus may be made use of for furnishing the atmospheric air under the proper pressure; but we prefer to introduce a reservoir C, to which the atmosphere is supplied by a pipe Z, and this reservoir C has an escape-valve L, which is weighted to maintain the proper pressure, and it opens to allow the free escape of atmosphere after a given pressure has been obtained, or when the gas making has been stopped, and from this vessel C, a pipe T passes downwardly and then upwardly into the chamber U, in in which is a valve V, to the upper end of the pipe T, and the pipe W descends from this reservoir U, and passes to the atomizer F. The object of this valve

V is to close the pipe T and prevent gaseous vapors passing backwardly into the atmosphere when the blower is stopped accidentally or otherwise.

"It will be apparent that the gaseous vapors, mixed with atmospheric air, can be passed directly from the pipe K to the forge, furnace or other heating apparatus, and if the discharge of gas is shut off at such apparatus the valve V will close, and the air will escape from the valve L, and as soon as the discharge of the burning gases is open at the forge or furnace the apparatus will commence automatically and supply the burning gas with uniformity to the flame of the furnace or other apparatus, and we also find that this gas is of great purity and is well adapted for illuminating purposes when applied to render incandescent a net-work of refractory material, such as in the Welsbach incandescent lamp." For further information, address the American Gas Furnace Co., 80 Nassau street, New York.

SKINNER'S NEW INDEPENDENT LATHE CHUCK.

We illustrate herewith the Skinner independent, reversible jaw lathe

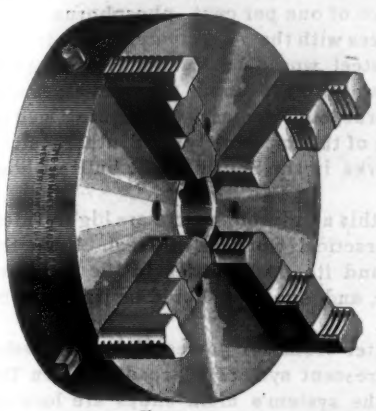


FIG. 1.

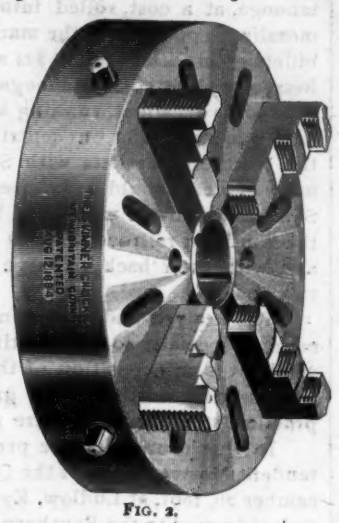


FIG. 2.

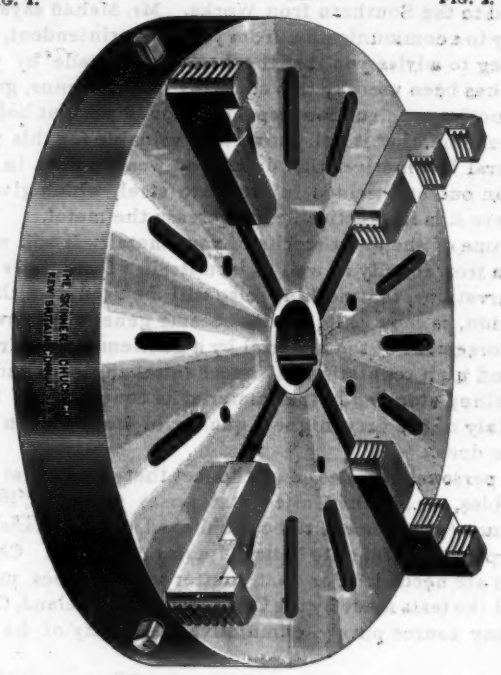


FIG. 3.

FIG. 4.

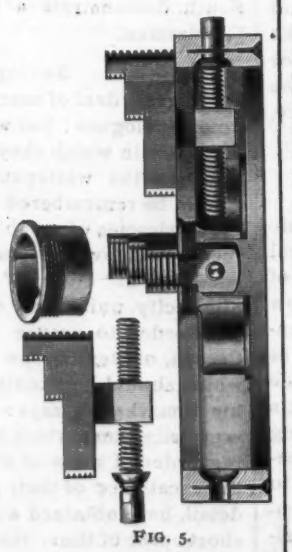
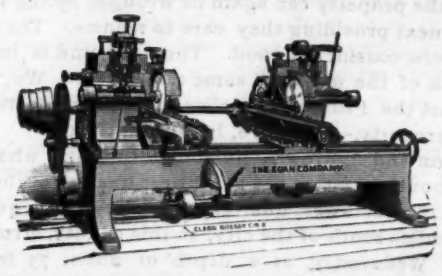


FIG. 5.

chuck, upon which a patent was issued November 17, 1891, to the Skinner Chuck Co., New Britain, Conn. In design and construction it differs from every other independent jaw lathe chuck. The body of the chuck is made of one casting, the face of which is unusually thick where the thrust of the screws come, and where the ways are in which the jaws run. The chuck is very strong, but is so designed as to be quite light to handle, and not unnecessarily to load the lathe spindle. The construction is such that the chuck and work can be brought near to the head of the lathe securing greater accuracy and allowing more capacity to the lathe. The hardened hub or bushing, which is peculiar to this chuck, receives the end thrust of the jaw screws when work is held on the outside bites of the chuck. The hub is threaded into the chuck body, and when in place helps to strengthen the chuck by binding the body together and resisting the strain of the jaws. When the jaws are to be reversed the hub is removed with a key wrench provided, and the jaws are run towards the center until they will leave the screw, and can then be reversed. The nut which contains a full thread being solid, and a part of the jaw gives a gripping power unequalled in any other independent chuck. The jaw screws which are of steel, have the United States standard shape of thread. These chucks are built in sizes of even inches from four inches to 42 inches. All chucks 12 inches and larger have suitable slots in the face for bolting on irregular shaped pieces and make the chuck body useful as a face-plate. Fig. 1 shows front of six inches to ten inches, inclusive. Fig. 2 shows front of 12 inches to 24 inches, inclusive. Fig. 3 shows front of 24 inches to 42 inches, inclusive. Fig. 4 shows back of 24 inches to 42 inches, inclusive. Fig. 5 shows a section with the center hub removed, also one of the jaw screws removed (with the jaw reversed), showing clearly the full threaded and solid nut.

IMPROVED DOUBLE TENONING MACHINE.

This cut represents a double tenoning machine, with automatic feed and double cut-off attachment. It will be found to be one of the greatest labor saving machines ever put into a wood-working factory. It will do more and better work than can be done on three single tenoners. It is simple to operate, not liable to get out of order, requires no expert to run it, and any man or boy with ordinary intelligence can operate it to advantage and with profit to the owner. The frame is one entire casting, heavily braced and planed perfectly true, and with ample floor space to insure steady running. The two housings rest upon the bed, one being stationary and the other adjustable, to suit the length of the stock tenoned, and operated by a hand wheel and screw at the end of the bed. The mandrels are of the best cast steel, running in self-



oiling boxes, lined with genuine babbit metal, with the pulleys placed between boxes. Each mandrel and slide has a separate adjustment up and down on the housings, to suit the thickness of tenon. The upper mandrel has also a side adjustment to allow a tenon to be cut longer on one side, if necessary. The cut-off mandrels are placed in advance of the cutter heads, and adjustable in every way independent of each other, and driven from the countershaft below. The feed is perfectly automatic in its operation, driven from the countershaft under the bed, and controlled by a lever handy to the operator. Suitable provision is made for changing the angle of the cut and length of tenon. The stock is held in position by adjustable pressure bars, holding each piece perfectly rigid while being cut, even if one piece is thicker than the other. There are four changes of feed to the machine to suit the work. This is the only thoroughly practical double tenoner for general use now on the market. It will be found suitable for sash, door and blind manufacturers, furniture makers, car works, in fact, wherever tenoning is done. This machine is bound to be a success. For further information address the introducers and builders, the Egan Co., Nos. 251 and 271 West Front street, Cincinati, O.

Why More American Tinplate is not Made.

Time is necessary for the establishment of the tinplate industry in the United States. The delay will not be in the tinning department but in the rolling. There is no doubt of the ability to make good black plate in American mills, because it has been made, and is now being made at different places, but our mills in general have not been accustomed to this line of work, hence reasonable time must be given even under the most favorable circumstances. In all probability, the manufacture of tinplate in this country will not receive its greatest impetus until after the next presidential campaign. If the elections, next Fall, show that the American people believe the present tariff law should be fully tried, the development of the tinplate industry will surprise those who are now so ready to declare its establishment in this country an impossibility.—[American Manufacturer.

Industrial Niagara.

The *Engineering News* says: "The Niagara Falls hydraulic tunnel is progressing rapidly. From the river to shaft No. 1, a distance of 2,240 feet, with 170 feet of open cut, the heading is nearly through. Between shaft 1 and 2 less than 600 feet remains to be driven, 850+1,150 feet having been already driven. Above shaft 2, toward the river above the falls, 1,140 feet has been driven. In all, the tunnel is 6,700 feet long, of which over 5 000 feet of heading has been already driven. The tunnel, as already described, is 25x25½ feet in section, and is to be lined throughout. We shall shortly give a full description of the complete plant as proposed. As yet it is impossible to give this correctly, for important features are not yet finally decided on."

LAKE SUPERIOR MINING NOTES.

The Great Northern Mining Co. has filed articles of incorporation for the purpose of carrying on a mining and smelting business. Its capital stock is placed at $2,000,000, with headquarters at Duluth. Its incorporators are L Robbins, T. Meritt, R. Brace, A. Meritt, W. Allnuth, John T. Culbertson, Napoleon Meritt, W. Meritt and H. A. Wing, all of Duluth.—[Mining News, Florence, Wis.

The articles of incorporation of the Mesaba Land & Exploration Co. have been sent to St. Paul. The company is stocked at $1,000,000, and the incorporators are Alfred Meritt, Roswell H. Palmer and John Heimer. The shares are placed at $10. The property is located part in 58-16 and in 58 18. Explorations will soon be commenced.—[Mining News, Florence, Wis.

The Finlay Mining & Exploring Co., the incorporators which are Negaunee men, is exploring a tract of mineral land located about four miles from Norway, and is meeting with great encouragement. A shaft is now down about 60 feet. Mixed ore has been found in a test pit sunk on the property, and the indications in the shaft denote that the ore body, which is confidentially believed to exist there, will soon be encountered. The work is under supervision of Capt. John Finlay, which is assurance that it is being skillfully prosecuted.—[The Marquette Mining Journal.

At the annual meeting of the stockholders of the Gogebic Iron Syndicate, at Milwaukee, Tuesday, the following Board of Directors was elected: John Huntington, J. V. Painter, H. C. Wick, D. B. Wick, H. C. Allison, F. B. Wagner, E. G. Osner, C. C. Ruthrauff and A. S. Upson, of Cleveland; S. H. Pomeroy, of Barry, O., and E. H. Smith, of Milwaukee. No other business was transacted, as a majority of the stock was not represented. Secretary Ruthrauff submitted a statement of the affairs of the company, showing them to be all right. A Wisconsin stockholder, who represented 1,500 shares at the meeting, expressed himself as well satisfied with the manner in which the company is conducted. "The affairs are in the hands of shrewd business men," he said, "and I am satisfied that everything is done as economical as possible."

Since taking hold of the Fitch property, the Iron Cliffs Co. have sunk a shaft some distance and find the showing of ore now much better than it has been for many months past. According to the recent arrangement by which they took hold, the property can again be wrought by the Fitch Iron Co. after the first of June next providing they care to resume. The chances for such a proceeding are now considered good. The ore found is in the bottom of the mine to the north of the old shaft some thirty feet. We hope it will keep growing and that the Fitch may realize a handsome return for the money invested in the property.—[Iron Ore, Ishpeming; Mich.

Nelson Norton and Andrew Kanutson, of this city, who have been exploring for several months past on the southwest quarter of the southeast quarter of section 3, and the northwest quarter of the northeast quarter of section 10, 38 18, about ten miles south of the city, in this county, struck a ledge of fine hard blue ore, Wednesday, at a depth of about 75 feet from the surface. Their shaft is in section 10, near the south line of 3. The gentlemen feel highly elated over their flattering prospects, and are sanguine of striking a large deposit of ore. They believe their exploration to be on either the Chapin or Quinnesec formation. A number of men are employed at the prospect and operations will be vigorously pushed. Messrs. Norton and Kanutson own the land on which they are exploring.—[Mining News, Florence, Wis.

The situation at Iron Mountain, at the present writing, is indeed a very gloomy one. The two magnificent iron properties, the Ludington and Hamilton, which are only second in importance to the great Chapin, have been temporarily abandoned in consequence of the mysterious flood of water which, about a week ago, broke through into the shafts a thousand or more feet below the surface, and 800 or 900 miners and laborers have been laid off. Where the immense flood of water comes from, is yet a mystery which the managers of the Ludington and Hamilton are anxious to solve. It is the impression among many mining men, however, that the water comes from Bass Lake, situated about two and a half miles from the Iron Mountain, and a mile or so east of the Menominee river. The ice in this lake is said to have lowered over a foot since the flooding of the mines, which leads to the belief that either the Hamilton or Ludington ore vein runs directly to and underneath the lake. The lake, which is about the size of Fisher Lake, is very deep and has neither an outlet or inlet. If its waters have at last found an outlet at the two mines, the lake may, of necessity, have to be drained into the Menominee river. Whether this could ever be successfully done is a matter which the best engineering talent must investigate and decide.—[Mining News, Florence, Wis.

STEEL MAKING IN THE SOUTH.

The *Tradesman*, of January 1, contained two notable articles on the topic covered by the headline foregoing. The first of these is an elaborate technical and practical exposition of the whole topic, prepared by Mr. G. Luetscher, of Chattanooga, an expert in all the steel processes. He first proceeds to show that (1) steel of the acid Bessemer and open-hearth processes, (2) basic open-hearth, (3) basic Bessemer, (4) duplex process can be produced in the South, as a commercial proposition; that is, these varieties of mild steel can be made here—all over our iron region—of Southern ores using Southern fuel, at a profit. This careful expert shows that the usually accepted notion among Northern iron masters that the South has no reliable supply of strictly Bessemer (non-phosphorus) ores is an error. He says the quantity of such ores, in the Cranberry lead lying along the line between Tennessee and North Carolina and in Southwest Virginia, is practically inexhaustible; and that the quality is superior. He then shows that excellent iron for the conversion of open-hearth basic steel and basic-Bessemer, and for the duplex process, can be smelted from ores widely distributed over the Southern ore belt.

Mr. Luetscher concludes that many things in the Southern steel industry should be improved (it would be wonderful if it were not so, as this industry is, as a commercial enterprise, only a year and four months old), and the first improvement suggested is a higher grade of skilled labor about the furnaces and converters. He is not of opinion that negro labor has sufficiently advanced in intelligence, steadiness and alertness to be generally used in the business with profit. Another improvement needed, is greater care and skill in selecting the ores and smelting the necessary pig iron. He advises the attraction of skilled labor from the North and Europe for the blast furnace, the steel furace and converter. "The blast furnace men," he says, "want to be educated up to the manufacture of basic pig iron on strictly scientific principles," and that done there will be no trouble about the raw material for the product.

On the practical points this writer is very clear. He says that splendid Siemens-basic steel is being produced at the Southern Iron Co.'s works, Chattanooga, at a cost, rolled into billets, of $24 a ton, which in the present demoralized condition of the market, readily sells at $28, while ordinary Bessemer billets go in Pittsburgh at $24 a ton. He says the Southern Iron Co.'s basic-Bessemer plant at Chattanooga has been so far perfected in operation, that the product is excellent, running as low as .06 of one per cent. phosphorus.

As to marketing, our contributor agrees with the *Tradesman*, that to invade the Northern markets with Southern steel would be bad policy. Southern users of steel should be induced to buy and use the home product, especially Southern railroad managers, boiler works, etc. He says the leading men of the Southern railroad systems are aware of the superiority of Southern steel, and with their backing large steel works in the South can be built without risk.

The analysis and tests printed with this admirable article are highly interesting, especially so to scientific and practical workers of steel. Upon the whole, it is an exposition of the trade and its possibilities in the Southern iron district, worthy of the great topic, and one that should be laid away by practical steel men for future reference.

In this connection we present a letter from Mr. James Mehan, Superintendent Motive Power of the Queen & Crescent system of roads, written December 26, 1891, at Ludlow, Ky., where the system's main shops are located, and addressed to the Southern Iron Works. Mr. Mehan says:

"In reply to a communication from your Superintendent, under date of the 21st inst., I beg to advise you that the basic steel made by your company at Chattanooga has been used by this company for rods, pins, guides, frames and general locomotive construction, especially for important bolts, and believe, as far as we have gone, that it will prove very valuable for this purpose.

"On several locomotives that developed weak points in their frames, we cut the section out and welded in the basic steel, which gives the necessary strength, where it is impracticable to increase the metal.

"This is one of the great merits of your metal. It will weld with itself or with common iron equally as well as iron itself. I am fully convinced from my own observations, that nothing else will be used in either locomotive or car construction, as soon as its merits became generally known."

This endorsement of the material by a gentlemen of Mr. Meehan's wide experience and high reputation as a mechanical engineer and scientific expert in railroad rolling stock and other material is conclusive of the subject. The steel is certainly of the very highest quality or Mr. Meehan would not commend it as he does.

We have personal knowledge of the fact that the largest producer of steel wire rope, cables, etc., in the United States uses this steel, but prefers not to allow the name of the concern to be published, as the manager don't care to have his competitors "get onto" its superior qualities. Certainly no more indorsements are needed. For that matter the analyses made by the best chemists, and the tests made by the Otis Steel Co., Cleveland, O., render endorsements from any source purely cumulative testimony of its high mechanical value.

And now the question comes to the front. What use is the South going to make of this splendid product, which a company of citizens are producing? Are our manufacturing capitalists going to allow this steel to be all sold to railroad shops or shipped North for a market? Or will they at once utilize it for the making of all sorts of finished articles for the Southern market? That the latter should be done goes without saying. If it is not done then will the South demonstrate a lamentable lack of enterprise and common sense.—[Tradesman.

Selling Machinery Abroad by Catalogue.

A great deal of money is spent annually by machinery makers in the get-up of catalogues; but we often wonder at the haphazard, confused, and incomplete way in which they are issued. For want of clearness and comprehen siveness, the wastepaper basket is too often their prompt destination. It should be remembered that business men are too fully occupied to puzzle out the intricacies of a publication which may appear to the sender to convey all the information necessary to secure business, but which stands in need of a good deal of "editing" to make it easy of comprehension by an outsider. Simplicity, uniformity of type, and clearness of arrangement, must be aimed at in order to secure attention. In the recently issued report of Consul Carden, of Mexico, we come across some remarks bearing on this subject, which should be attentively read by machinery exporters. In the course of his remarks he says:—"I may mention that, while ordinary catalogues, especially those which have no prices attached, are of little or no use in obtaining orders, I know of one case of a Liverpool firm who, exclusively through the excellence of their price list, which indeed was a model of comprehensive detail, have obtained a connection in this city which has, in a comparatively short space of time, resulted in their doing business to the extent of many thousands of pounds."—[London Machinery Market.

THE stockholders of the Oliver Iron & Steel Co., of Pittsburgh, Pa., have voted to increase the capital stock of the company from $1,600,000 to $2,000,000.

PIG IRON.—HISTORY AND A PREDICTION.

The following table shows in a condensed form the ups and downs of the iron trade in the United States for the past 30 years:

Year.	Production in tons of 2,000 lbs.	Term, years.	Average increase per year, tons.	Average decrease per year, tons.
1860	731,544			
1873	2,868,278	12	178,061	
1876	2,093,236	3		258,347
1882	5,178,122	6	514,148	
1885	4,529,869	3		216,084
1890	10,307,028	5	1,155,342	
1891	est'd 9,000,000	1		1,300,000 est'd

Skipping over the periods of depression, 1873 to 1876, and 1882 to 1885, and taking the years of maximum production in each period, we have the following figures, showing the rate of growth from 1860 to 1890:

Year.	Production, net tons.	Term, years.	Average increase per year, tons.
1861	731,544		
1873	2,868,223	12	178,061
1882	5,178,122	9	255,538
1890	10,307,028	8	641,113

Since the same causes which produced this wonderful growth during the past thirty years still exist, and are likely to continue for many years to come, viz: the increase of population, the increase of wealth per capita, the increasing substitution of iron for wood, stone and brick in construction, the increase of weight of rails and of all iron structures, we may safely assume that the average rate of increase during the next ten years will be not less than 1,000,000 tons per year, and predict that the production of iron in the United States by the year 1900 will have reached 20,000,000 net tons. The only causes which may prevent this consummation, as far as our present light extends, are war, pestilence, a succession of short crops, or some financial or political convulsion which may change existing economic conditions, such as the repeal of our present tariff laws.

Another set of figures from which the probable production in 1900 may be estimated is the production reached in the year at the end of each of the ten-year periods; that is, 1860, 1870, 1880 and 1890. The figures are as follows:

Year.	Production, net tons.	Increase in 10 years. per cent.
1860	919,770	
1870	1,865,000	102.8
1880	4,295,414	130.3
1890	10,307,028	140.0

A production of 20,000,000 tons in 1900 would be an increase of only 94 per cent. over that of 1890. Each of the three ten-year periods before 1890 showed an increase of over 100 per cent., and the latest one 140 per cent., and there seems to be no reason for believing that the increase in the next ten years should be less than 100 per cent.—[Wm. Kent in Cassier's Magazine.

British Minerals at the Columbus Fair.

A circular has been addressed to owners of metalliferous mines in England by Sir Henry T. Wood, as Secretary of the Royal Commission for the Chicago Exhibition, in which it is stated that the commission is anxious to comply with a request made to it by the executive authorities of the exhibition, that a typical collection of British minerals may be included in the British section, and asking for the co-operation of owners and managers of mines in carrying this proposition into effect. Owners are requested to favor the commission with a typical specimen of each of the principal minerals raised at their mines. Mr. B. H. Brough, the instructor in mine surveying at the Royal College of Science, South Kensington, has undertaken to classify and arrange the collection. It is added that it should be born in mind that what is required is not specimens of special value or rarity, but samples of ordinary ores, etc., so that the collection, when complete, may be fully illustrative of the mineral resources of the kingdom. At the close of the exhibition the collection will be presented to an American museum, so that it will have a permanent value.

Electric Ventilating Fans.

Electrically driven ventilating fans for dwelling houses, workshops, offices, and public resorts generally are receiving considerable attention in Germany. The *Allgemeine Electricitats Gesellschaft*, of Berlin, among others, is prominent in advertising their merits and securing their extensive use. This movement among German engineers may be taken as a flattering tribute to American engineering enterprise, to which the development in this field is primarily due.

Straightening Steel Plates.

Herr E. Stridsberg, engineer, of Gullœfors Factory, Trollhættan, Sweden, has patented a method for straightening steel plates, etc., without hammering, which latter may have an injurious effect on the metal. The heated plate is plunged into the hardening bath, but is not allowed to remain there until quite cold as heretofore. When the temperature is somewhat lowered it is taken out and placed between two cold discs in a hydraulic press, which is then screwed down.

Japanese Iron Pipes.

It is stated that experiments have recently been made at the Oji Steel Works, in Japan, in the manufacture of iron pipes with a mixture of British and Japanese iron, in the proportion of seven to three. The results are reported to be eminently satisfactory. The pipes are capable of enduring nearly twice the pressure necessary for use in the Tokio waterworks, and it is believed that they can be manufactured at from 10 to 15 per cent. less than the cost of imported pipes.

INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trade:

Jackson, Mich.—Lewis & Allen Spring Co.; capital, $10,000; for the manufacture and sale of springs; incorporators: Chas. Lewis, T. Emmet, Jas. W. Blakely, of Jackson, Mich.

Belleville, Ill.—Excelsior Foundry Co., Belleville, Ill.; capital, $10,000; for the manufacture of gray iron castings; incorporators: Geo. B. M Rogers, Ed. P. Rogers, John E. Thomas.

Toledo, Iowa.—The Iowa Scale Co.; capital, $50,000; for the manufacture of scales; incorporators: W. F. Johnson, M. S. Dowry, L. Clark, P. G. Wieting, S. Stiger, J W. Ballard, all of Toledo, Iowa.

Chicago, Ill.—Smith & Phillips Manufacturing Co.; capital, $50,000; for the purpose of manufacturing and dealing in machinery and other articles; incorporators: C. H. Smith, F. V. Phillips, D. E. Smith.

Keokuk, Ia.—A. Weber Co.; capital, $100,000; to manufacture, import, buy and sell iron, hardware and similar merchandise; incorporators: Slois Weber, John Crosgrove, Carl A. Weber, Frank J. Weber, Keokuk, Ia.

Detroit, Mich.—Detroit Brake Beam Co.; capital, $150,000; for the manufacture and sale of brake beams and other railway appliances; incorporators: Robert C. Moodey, Cleveland, O.; Geo. Fuller, St. Paul, Minn.

Davison, Mich.—Davison Manufacturing Co.; capital, $5,000; for the manufacture and sale of household and farm articles, tools, etc.; incorporators: John F. Cartwright, Roscoe J. Groves, Howard Howas, Davison, Mich.

Keokuk, Ia.—Keokuk Stove Works; capital, $150,000; for the manufacture and sale of stoves; incorporators: H. C. Huiskamp, Wm. Burkett, C. H. Castle, H. Scott Howell, John Hobbs, Wm. Reddie, I. M. Walters, Waterloo, Ia.

Chicago, Ill.—The International Steel Post Co.; capital, $500,000; to manufacture and sell metal posts; acquire and sell patents pertaining to such manufacture; incorporators: H. S. Gillette, Wm. H. Taylor, DeWitt Stearns.

La Fayette, Ind.—The B. F. Biggs Pump Co.; capital, $50,000; for the manufacture and sale of pumps, pump material and supplies; incorporators: Mahlon H. Timberlake, Geo. W. Mayo, Jas. H. Bradshaw, all of La Fayette, Ind.

Canton, O.—The Canton Buggy Co.; capital, $15,000; for the purpose of manufacturing, selling and dealing in buggies, vehicles, etc; incorporators: Morris W. Miller, Otto Giessen, Frank W. Miller, Wm J. Fiero, Harvey H. Miller.

Chicago, Ill.—The Illinois Electric Lamp Co.; capital, $25,000; for the purpose of manufacturing and selling incandescent electric lamps, and other electric appliances; incorporators: John F. Schaefer, O M. Smith, Frank E. Baker.

Chicago, Ill.—Standard Safety Heating Co. of Illinois; capital $500,000; for the manufacture and sale of heating apparatus under the Morton safety system of stored heat; incorporators: Sidney Adler, Philip Lauth, Jr., Nicholas Michels.

McKeesport, Pa.—The Standard Burial Case & Manufacturing Co; capital, $30,000; for the purpose of manufacturing iron or steel or both, or any other metal, etc.; incorporators: Wm. O Bryon, Jas. L. DeLong, W. E. Hartman, all of McKeesport, Pa.

Sidney, O.—The Sidney Pole & Shaft Co.; capital, $20,000; for the purpose of manufacturing and ironing carriage poles and shafts, purchasing material for same, etc.; incorporators: J. H. Smith, W. A. Snyder, A. G. Snyder, H. A. Lanman, F. G. Waddell.

Chicago, Ill.—Reid Mail Elevator Co.; capital, $500,000; to manufacture, sell, lease and erect elevators for raising mail matter and other small articles from lower to upper stories of buildings; incorporators: Chas. E. Reid, M. C. Krarup, L. R. Wickes.

Spencer, Ia.—The Spencer Vehicle Holdback Co.; capital, $5,000; to manufacture, sell and traffic in a certain appliance known as Burk's patent holdback; incorporators: L. A. Butler, A. W. Taylor, F. T. Verharen, Geo. H. Boynton, A. J. McIntire, Spencer, Ia.

New York City, N. Y.—Bliven Palace Steamship Co., (incorporated in West Virginia); capital, $1,000,000; for the purpose of building and operating all kinds of marine vessels, engines, boilers, etc.; incorporators: J. N. Hegeman, L. E. Spencer, both of New York City.

Rochester, N. Y.—Rochester Improvement Co.; capital, $5,000; for the manufacture and sale of Draper stone patent sash improvement or metallic weather strip and other similar goods; incorporators: A. E. Slight, H. Eugene, Otis W. Dryer, of Rochester, N. Y.

Cleveland, O.—The Cleveland Wire Spring Co.; capital, $25,000; for the purpose of manufacturing and dealing in all kinds of springs and spring devices, wire and wire goods, etc.; incorporators: N. L. Hilliard, W. C. Weller, W. W. Morse, D. O. Benedict, Geo. W. Mason.

Cincinnati, O.—The Chickasaw Oil & Gas Co.; capital, $30,000; for the purpose of constructing, drilling and operating oil and gas wells, refining oil, manufacturing gas, etc.; incorporators: John A. Kreis, Henry Oskamp, Albert McCullough, Charles F. Droste, Albert Bettinger.

Dixon, Ill.—Brink & Deeter Co.; capital, $15,000; for the purpose of operating planing and saw mill and manufacture and sale of sash, door and blinds, implements, machinery, house, store and office fittings and furnishings; incorporators: Isaiah Brink, John A. Deeter, Chas. S. Brink.

Rock Island, Ill.—Davis Co.; capital, $50,000; to do plumbing, gas and steam fitting and general contracting business, together with the manufacture of and dealing in goods pertaining to said business; incorporators: Thomas B. Davis, Samuel S. Davis, Walter E. Telles, Robert K. Swan.

New York City, N. Y.—The State American Construction Co.; capital, $50,000; to construct houses, roads, bridges, viaducts, etc.; incorporators: Nicholas Conforti, 210 E. 115 street, New York; Abraham Steers, foot of 125

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The Measure of Excellence and Profit.

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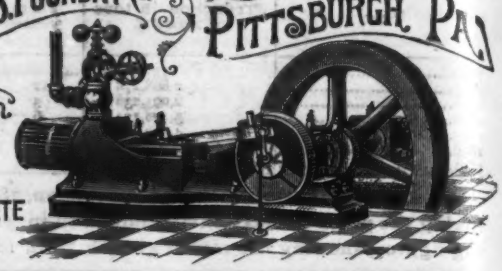

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CLEVELAND OFFICE: Bradley Block.
NEW YORK OFFICE 74 Cortlandt St.

Works: BARBERTON, SUMMIT COUNTY, OHIO.

street, Harlem River, New York; Peter Altieri, 349 E. 113 street, New York.

Cleveland, O.—The Sportsman Supply Co.; capital $50,000; for the purpose of manufacturing, purchasing and dealing in all kinds of sporting goods, including fire-arms, bicycles, base-ball supplies, etc.; incorporators: Thos. Larter, Harry S. Nelson, John J. Corlett, Chas. A. Larter, Edwin R. Larter.

Philadelphia, Pa.—Strohm Automatic Electrical Safety Block System Co., (incorporated in West Virginia); capital, $5,000,000; for the purpose of manufacturing, selling and renting to railroads or other companies, block and safety appliances; incorporators: F. W. Sutterle, John P. Mathien, B. S. Wright.

West Union Ia.—Hattery Manufacturing Co.; capital, $90,000; to manufacture the Hattery Fitting for double piping of gas, water, steam and natural gas, druggist and other stills and steam condensers; incorporators: S. B. Zeigler, S. E. Robinson, J. Weed, A. K. White, D. D. Harr, Joseph H. Hattery, E. L. Lamb, West Union, Ia.

Chicago, Ill.—The Chicago Power Supply & Smoke Abating Co.; capital, $10,000,000; for the manufacture, sale and distribution of compressed air and steam for power and other purposes; to furnish power, heat and ventilation, and to do a general manufacturing and commercial business; incorporators: John P. Bacon, John H. Hume, Chester M. Dawes.

OTHER NEW ENTERPRISES.

O. T. Dozier will, it is stated, organize a stock company for the manufacture of his patent mailing machine, at Birmingham, Ala.

The Windsor Locks Steel Co., of Windsor Locks, Conn., have made alterations and improvements that will double the capacity of their plant.

Rumsey & Sikemeier Co. have been incorporated at East St. Louis, to manufacture and deal in all kinds of machinery and conduct a general merchantile business; capital stock, $200,000; incorporators, William C. Rumsey, Henry Sikemeier and Margaret Sikemeir.

The Consolidated Iron Co., recently formed and chartered under the laws of Kansas, have purchased the old Consolidated Iron Works plant, at Riverdale, Kan. The company will begin operations at once, and will manufacture sash weights and do a general casting business.

The Standard Engineering Co., of East St. Louis, has filed articles of incorporation; object, to erect water works and complete steam plants, also to manufacture and sell engineering supplies; capital, $250,000; incorporators, Philip Ross, George W. Caudle and Henry C. Whithers.

The Wellington Machine Co., of Wellington, O., has been chartered to engage in running a foundry and manufacturing wood-working machinery, by Frank W. Bennett, Edward F. Webster, Harry S. Bennett, Christopher McDermott and Chas. H. Horton. Authorized capital, $100,000.

J. H. Carter, J. W. Dorr, and T. H. Curry have incorporated the Southern Street Car Co., at Pensacola, Fla., with a capital stock of $500,000, of which about $350,000 has already been subscribed. The company's purpose is to lease and to manufacture street cars to be propelled by spring power. R. E. Sharrard is temporary general superintendent.

The Detroit Car Window Ventilator Co., of Detroit, Mich., has been formed with capital stock of $10,000, for the manufacture of Reynolds' patent car window ventilator. The stockholders of the company are: H. H. Reynolds, John G. Grant, W. H. Woodbury, Chas. M. Hammond, Walter D. Stower, and others. The company is now putting the device upon the market.

The following are among the recent Illinois incorporations: The Karr Supply Co., of Belleville, to operate a machine shop; capital, $20,000; incorporators, Theo. Karr, Martha Karr and Adam Karr.—Chicago Clutch & Machinery Co., at Chicago; capital, $30,000; incorporators, Oliver P. Hurford, James J. Hoch and L. S. Koester.—Centralia Iron & Steel Works, at Centralia; capital, $50,000; incorporators, Gabriel C. McDonald, Charles L. McDonald and Eliza McDonald.—The Chicago Cash Carrier Co., of Chicago; capital $250,000; incorporators, E. S. Skinner, J. D. Falley and J. F. Bartle.

Fires and Accidents:—

The works of the Waterbury (Conn.) Brass Co. were burned on the 13th inst. Loss, $260,000; insurance, $187,000.

The mills of the Pratt Manufacturing Co., at Worcester, Mass., were destroyed by fire on the 12th inst.; loss, $60,000.

The Louisville & Nashville Railway shops at Decatur, Ala., were destroyed by fire on the 8th inst. The loss is $40,000; fully insured. Fifty cars were consumed. About 75 men were thrown out of employment.

On January 13 the S. M. York power block in Cleveland, occupied by a number of manufacturing establishments, was completely demolished by fire. The building was occupied by the Champion Safety Lock Co., the Kean & Doty Manufacturing Co., manufacturers of builders' hardware, and the National Iron & Wire Co. The loss to the building was placed at $40,000, and the loss of the firms will aggregate about $100,000, making a total loss of $140,000. The exact amount of the insurance carried by the different firms is not known.

General Industrial Notes:—

Taylor & Co.'s Iron Foundry, 415 to 425 Driggs avenue, Brooklyn, N. Y., are putting an addition of 100 feet to their already large and well-equipped foundry to facilitate their increased business.

W. L. Meisfelder, proprietor of the Cincinnati Pattern Works, has removed from the northwest corner of Front and Pike street, to 177 and 181 East Pearl street, Cincinnati, O., which will give him greatly increased facilities.

Sealed proposals will be received at the office of the Custodian of the United State Marine Hospital at Memphis, Tenn., until 12 o'clock, M., on the 28th day of January, 1892, for all the labor and materials required for a new hot water boiler, new ventilators, and for miscellaneous repairs to the United States Marine Hospital at Memphis.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until two o'clock P. M., on the 10th day of February, 1892, for all the labor and materials required for putting in place complete, the low-pressure, return-circulation, steam-heating and ventilating apparatus for the United States Post Office, etc., building at Portsmouth, O.

J. J. Spilker, who for some years has been located at No.s 48 and 50 Central avenue, Cincinnati, O., has recently moved into larger quarters in the rear of his old location. He is engaged in the manufacture of patent adjustable, joint cutters, universal miter boxes and miter planes, parallel lever vises, composition ornamenting machines, and special tools for various purposes. The joint cutters, mitering machines, mitering boxes and planes will be found of much value to pattern makers and makers of machinery of all kinds. Those who have used these machines are well pleased with them. The new location gives Mr. Spilker greater facilities for carrying on his business. He makes a specialty of mitering machines, and expects soon to bring out some new designs in this line.

TYPEWRITERS.

THE REMINGTON
STANDARD TYPEWRITER

Is to-day, as it has ever been, the leading Typewriter.

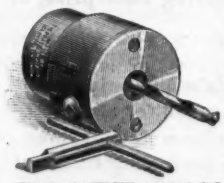
Carefully tested improvements are constantly added to this famous machine.

TRY OUR PARAGON BRAND OF TYPEWRITER RIBBONS.

WYCKOFF, SEAMANS AND BENEDICT,
137 Superior St., Cleveland, O.

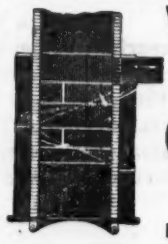
Positive Driving Drill Chuck.

For either straight or taper shank drills.



Has the Holding Power of Taper Socket, together with all the advantages of the common Friction Chuck Write for Illustrated Price List and discounts to the

PRATT CHUCK CO.,
Clayville, N. Y., U. S. A.



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HOT BLAST
COLLIAU CUPOLA

ADDRESS:
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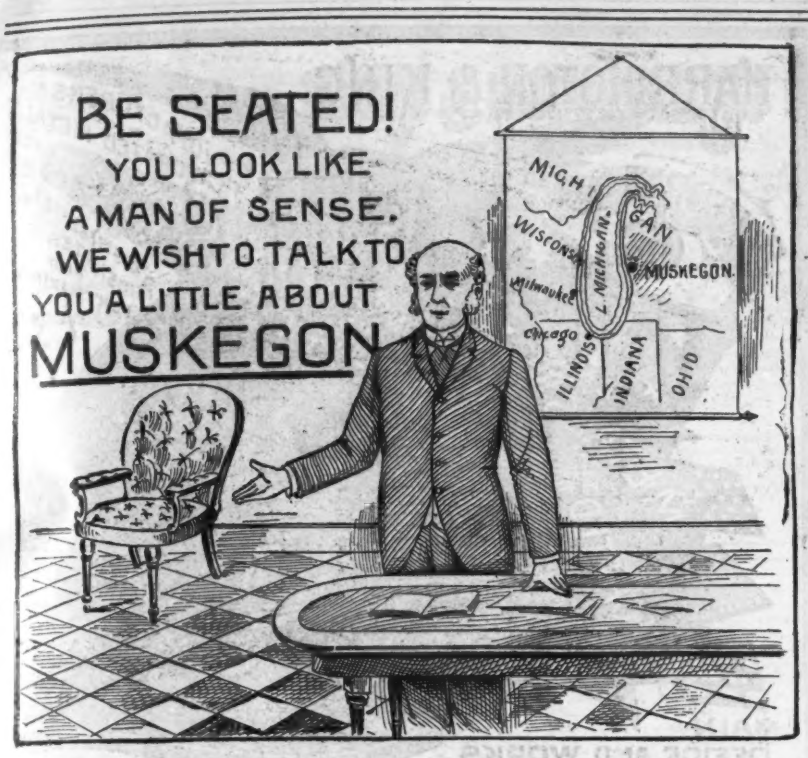
DETROIT, - MICH.



I wish to say to you that for the Manufacturer or Investor

THE CITY OF MUSKEGON, MICH.,

offers greater opportunities, has more real merit than ANY young City of the United States.

I AM aware that this is a BOLD STATEMENT, but I am prepared to give **Facts and Figures that will astonish you.** Notice this map on the wall, the Lake Michigan District, four States, having a common center (Lake Michigan). These four States, bordering on the only great body of water lying wholly within the United States, have an average age as States—61 years—and no district of the world ever made such a record. These four States: Illinois, Indiana, Michigan and Wisconsin, had, by the census of 1890, 9,781,255 population, or nearly one-sixth of the entire population of the Union; they have over one-fifth of the railway mileage of the United States, and over one-tenth of the railway mileage of the world; and talk about rapid growth—**Look at this table:**

NAME OF STATE.	GAIN LAST 30 YEARS.	PRESENT POPULATION—1890.
ILLINOIS	2,106,585	3,818,536
INDIANA	1,514,117	2,189,030
MICHIGAN	1,340,679	2,089,792
WISCONSIN	907,016	1,683 897
TOTAL	5,868,397	9,781,255

This 30 years gain—5,868,397—is MORE than the present ENTIRE POPULATION of the following FIFTEEN STATES, viz:

NOTE:—

MICHIGAN, which is twenty years younger than Illinois or Indiana, made nearly

23 PER CENT.

of the entire gain of this four-state district for the last thirty years.

THE FOUR-STATE GAIN WAS 5,868,397.

The present population of this four-state district is 9,781,255 or MORE than the 22 opposite: ☞

See U. S. Census 1890.

1	California	1,204,002
2	Colorado	410,975
3	Connecticut	745,861
4	Maine	660,251
5	Vermont	332,205
6	New Hampshire	375,227
7	Rhode Island	345,343
8	Delaware	167,861
9	Montana	131,769
10	Nevada	44,327
11	Washington	349,516
12	Utah	206,498
13	Oregon	312,490
14	North Dakota	182,425
15	South Dakota	327,848
	Total	5,796,598
16	West Virginia	760,448
17	Maryland	1,040,431
18	Florida	390,435
19	Idaho	84,229
20	New Jersey	1,441,017
21	Wyoming	60,589
22	New Mexico	144,862
	Total	9,718,609

NOTE.—Michigan gained more population in the last **30** years—see table above—than the present entire population of Connecticut, Vermont and Delaware combined, or within 5,000 as much population as Oregon, Washington, Colorado, Montana and Nevada have combined.

NOTE.—Michigan gained more population in the last **10** years than **Virginia and Georgia** together gained, or than **Kentucky and Tennessee**, or **Alabama and Mississippi** combined gained.

YOU ARE SURPRISED AT THIS.

It was your impression that all the growth and wealth of this district was at the south end of Lake Michigan, but let me tell you right here that the great intrinsic wealth is farther north, in the Iron, Copper, Salt and Timber district. The hardwood forests have scarcely been touched. Michigan puts out yearly over half the Iron Ore mined in the United States; more than all the Southern States combined. Nearly every pound of Steel made in Pennsylvania and Ohio is made from Ore coming from this district, (96.3 per cent of the Steel output of the United States for 1890 is accredited to six States lying along the **Great Lakes**) and this output was 100,000 tons more than that of Great Britain for 1889—**MICHIGAN FURNISHED THE ORE.**

When You Have Absorbed

THE

FOREGOING FACTS AND FIGURES

You are beginning to reach a point where you will appreciate the location of the City of

MUSKEGON.

Notice on this Map on the wall, and in the Cut below,

MUSKEGON'S CENTRAL LOCATION

IN THIS GREAT

TEN MILLION POPULATION DISTRICT.

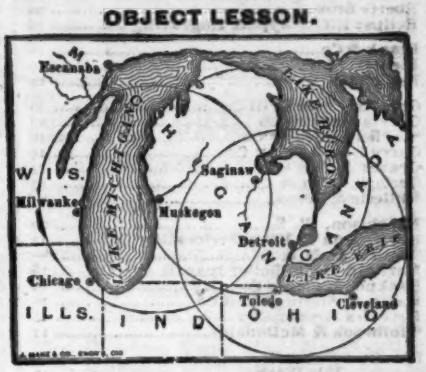
IT HAS THE BEST LOCATION IN MICHIGAN.

LOOK AT THIS!

3 MICHIGAN CIRCLES.
NAVIGATION CITIES.

Radius of Each Circle, 125 Miles.

OBJECT LESSON.



POPULATION:—Each Circle has in round numbers in United States population as follows:

SAGINAW CIRCLE,	1,725,000
DETROIT CIRCLE,	2,600,000
MUSKEGON CIRCLE,	2,725,000

NOTE.—See Cram's Atlas, Census 1890, by Counties.

The great business centers of this Lake Michigan District are the Coast Cities. **Muskegon** is third in size on this great body of water and has the finest natural inside Harbor on Lake Michigan, sixteen miles of water front, all available, deep water—114 miles from Chicago and 85 miles from Milwaukee, with which two cities **navigation is open the year round.** Only 175 miles by navigation from the greatest **Bessemer Ore** shipping docks in the **world.** Rare combination—**Raw Materials, Best Shipping Facilities and Best Markets** in the United States.

IT IS AN ACTUAL FACT that cargoes of heavy merchandise can be carried from **Muskegon** to the business center of **Chicago quicker** and for **less money** than the same quantity can be brought in by **rail** from points 10 to 15 miles outside the limits of Chicago. No experiment. Doing it now.

These great advantages are beginning to be appreciated. Twenty-one factories have been located in the last eighteen months. Among the factories secured are: **The Alaska Refrigerator Co., Large Rolling Mill, New Steel Works, Chase Bros. Piano Co., Sargeant's Invalid Chair Co., Nelson Piano Co., Mich. Washing Mach. Co., Malleable Iron Works, Machine and Foundry Co., Electric Alarm Co., Shaw Electric Crane Co., Houck Furniture Co., Electrical Power Co., Muskegon Cracker Co., Standard Oil Co. Barreling Works, Morton Key Seating Co., Kelly Bros. Mfg. Co., Heaps Earth Closet Co., Gray Bros. Mfg. Co., Hartshorn Shade Roller Co., New Flouring Mill**—All just completed or now building.

Why do you "CHASE RAINBOWS" on the outskirts of the Country, and invest at high prices, when you can get property near the great business center of the "Central West" for half the money, and having double the intrinsic worth?

A GOLDEN OPPORTUNITY IS BEFORE YOU.

THE MUSKEGON IMPROVEMENT CO., composed of leading citizens, have just commenced their **2nd Great Lot Sale. 2,000 Lots** at the uniform price of **$165 each,** location to be determined by allotment as soon as 50 per. cent. is paid in. **Terms of Subscription:** $15 down, balance $10 each month. $165 secures you a good lot, 50x125 feet, with alley in rear, in the phenomenal addition **"MUSKEGON HEIGHTS,"** which addition is pronounced by Real Estate Experts to be as fine an addition as any city in this country can show. It is less than one and one-half miles from the business center of the City of Muskegon, with which it is connected by handsome, paved streets and an Electric Street Railway. This addition has twelve **large** factories located upon it **now**; has good Hotel, Brick Blocks and Stores, Depot, three paved streets, a large number of good residences. Every lot is level and desirable. **There is not a lot on the addition worth less than the price asked.** The net avails of this sale to be used to locate ten more factories. All the factories on Muskegon Heights are solid, substantial brick structures, the smallest is 50x150 feet, 2 stories; the largest plant is two buildings, each 60x400, one 2 stories, the other 3 stories high; the latter plant is owned by four Bank Presidents and is the largest factory of its kind in the world. **DON'T MISS THIS OPPORTUNITY. Such chances for sure paying investment are rare.**

If you wish to subscribe, remit by Money Order, P. O. or Express, or Bank Draft, to

F. H. HOLBROOK, Sec'y Board of Trade, or

HOLBROOK & McDONALD, SALES AGTS.,

MUSKEGON IMPROVEMENT CO.

REFERENCES: Any Bank in the City of Muskegon. Send for Maps, Plats and Information.

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A SPLENDID CHANCE

TO ESTABLISH YOURSELF IN A

Good Paying Business.

I have for sale a small MACHINE SHOP with good Tools, now manufacturing specialties and a good jobbing trade offered. LOW RENT. Can work into a big business. Call on or address

JAMES JENKS.

Dealer in Machinery, DETROIT, MICH.

PASSENGER TRAFFIC.

The Inauguration of a New Regime by the Pennsylvania Lines,

(From Pittsburgh Dispatch.)

When, at the meeting of the General Passenger Agents held in Chicago not long ago to consider arrangements for taking care of the World's Fair traffic, Mr E. A. Ford, the General Passenger Agent of the Pennsylvania Lines, in speaking of the attaches of the proposed Columbian Passenger Committee's Bureau of Information, said that gentlemen should be employed who would attend to their business in a gentlemanly way and not circulate for the purpose of seizing passengers by the nape of the neck and hauling them into the office, he indicated a line of policy which in the past few years is perceptibility taking the place of methods of old time passenger men It is becoming understood that the interests of a rail road company, in so far as the passenger traffiic is concerned, are not best served by the persistent pursuit of passengers at all times and under all circumstances, but by the concentration of effort upon the prompt and systematic movemeat of traffic, upon the clearness and exactness of the processes of operation and upon the diffusion in a comprehensible manner of complete information regarding the train service. It was once considered necessary to fill trains by hunting passengers; it is the belief of the Pennsylvania Lines that it is better to bestow such care upon their equipment and operation, upon the training and conduct of employes that passengers will hunt their trains.

Not so very many years ago it was considered indispensible in a passenger agent that he should be hale fellow well met with everyone; that he should regard no terms of praise too extravagant for his own line, and no words of condemnation too strong for his rivals; that he should beleaguer farmers intending emigrate, court the favor of army officers controlling the movement of troops, treat with great deference the advance agents of circuses, theatrical troupes and base ball clubs, "set 'em up" to newspaper reporters and know as many "funny stories" as any commercial traveler.

He had to hold himself in readiness to go on a midnight frolic, play poker or get drunk, as might seem necessary, to have tickets purchased or travel directed over his road. His watchword was popularity, and popularity he sought in season and out of season, confusing too often a certain so-called personal popularity with the popularity of his road. To obtain a free pass a newspaper reporter had only to mention that Colonel Fricasee, the genial General Passenger Agent of the Pumpkin Vine Short Line was in town, and the theatrical manager who tendered a box to the genial Colonel was not without an eye to future recompense in the way of a cheap rate and an increased allowance of free baggage for his troupe. And it not infrequently happened that the passenger agent who went after wool got shorn. Many a farmer not so green as he looked would use one passenger agent as a foil to another until the rate quoted for the movement of his family and household goods bore about the same relation to the regular tariff as a hamfat actor's pay used to bear to his advertised salary, and likewise with the advance agent, the emigrant agent and others whose "influence" was sought.

This undue solicitation of traffic had evil effects in other ways. The passengers secured by solicitation were often accorded privileges and accommodations that were denied the regular every day patrons of the railway who paid regular fares and never came in contact with the passenger solicitor. In so far as the Pennsylvania Lines are concerned it has been decreed that undue solicitation and all undignified reaching for popularity shall cease; that communication with the company's patrons be conducted with due regard for the amenities of business intercourse; that intending passengers be neither ensnared nor cajoled, but politely given exact information and permitted to purchase tickets or not as they may choose. It is the intention that no passenger be given a secret advantage over another, that the great numbers of those who contribute most largely to filling the passenger trains and contribute the greater portion of the passenger revenne may go to the regular ticket offices and obtain equal accommodations at equal rates with those who privately seek the passenger agent's ear.

THE NEW PHILADELPHIA IRON AND STEEL CO.
MANUFACTURERS OF
SHEET IRON AND SHEET STEEL
FOR Roofing, Galvanizing AND ALL OTHER PURPOSES.
N.P.I.&S.CO.
N.P.
REFINED
TRADE MARK
OFFICE AND WORKS
NEW PHILADELPHIA OHIO.

THE HARRINGTON & KING PERFORATING CO.
MANUFACTURERS OF PERFORATED METALS FOR
SUGAR HOUSES, DISTILLERIES, PHOSPHATES AND FERTILIZING WORKS.
COTTON SEED OIL MILLS. RICE MILLS.
PERFORATED METALS
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284 Pearl St. cor. Beekman, NEW YORK.

COPELAND & BACON.
HOISTING & WINDING ENGINES
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85 LIBERTY ST., NEW YORK.
555 ARCH ST., PHILADELPHIA

WHY? ARE YOU USING THAT CLUMSY OLD FASHIONED HOT IRON ROD FOR YOUR FLUE CLEANER? "FIREMEN'S FRIEND". WHY?
DO YOU NOT USE THE "FIREMEN'S FRIEND" AND SECURE RELIEF.
MANUFACTURED BY
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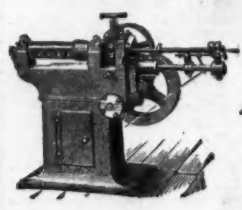
JOHN S. HALL, 40 CORTLANDT ST., NEW YORK, N. Y.
H. D. EDWARDS & CO., 16-24 WOODWARD AVE., DETROIT, MICH.
RUGG, FULLER & CO., 212-214 FIRST ST. N. MINNEAPOLIS, MINN.

WHEN YOU WANT

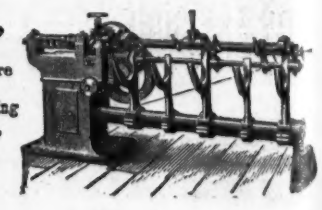
Moulding Sand, Fire Sand, Fire Clay, Bristle Brushes, Steel Wire Brushes, Moulders' Bellows, Riddles, Shovels, Foundry Facings, etc., send to

THE J. DOWNERD & SON CO., Zanesville, O.

☞ We can furnish you best quality goods at lower prices than you can get elsewhere. Try us.



JOHN ADT & SON,
New Haven, Conn.
Builders of Machinery for Hardware Manufacture.
Automatic Wire Straightening and Cutting Machines, Butt Milling Machinery, Butt Drilling Machinery, Riveting Machines, Foot Presses, Sprue Cutters, Etc.



CATALOGUES Printed in the Highest Style of Art, by The Cleveland Printing & Publishing Co., Cleveland, O.

CLEVELAND ROLLING MILL CO.,
—MANUFACTURERS OF—
BESSEMER AND OPEN-HEARTH STEEL,
Blooms, Billets, and Slabs. Steel Rails, Steel Beams, Channels and Angles. Steel Forgings. Bar, Spring and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire. Iron and Steel Plates. Galvanized and Black Sheet Iron and Steel. Corrugated Iron Roofing.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash) Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 00@16 75; Southern Coke No. 2 Foundry, $15 00@15 75; Southern Coke No. 3 Foundry, $14 25@15 00; Southern Coke No 1, Softeners, $15 00@15 75; Southern Coke No. 2, Softeners, $14 25@15 00; Ohio Silveries No. 1, $17 50@18 50; Ohio Silveries No. 2, $16 50@ 17 50; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 00@18 00; Lake Superior Charcoal Nos. 1 to 6, $17 00@18 00; Tennessee Charcoal No. 1, $17 00@18 00; Tennessee Charcoal No. 2, $16 50@17 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $14 75@15 25; Southern coke, No. 2 and No. 1 soft, $13 75@$14 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 00; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $17 00@17 50; Hanging Rock Charcoal, No. 1 foundry, $19 75@21 00. MILL IRONS—Standard Southern Coke, grey forge, $12 50@12 75; Standard Southern Coke, mottled, $12 25@12 50; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 00@20 00; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $16 00@16 50; Mahoning and Shenango Valley strong, No. 2 Foundry, $15 00@15 50; Ohio Softener No. 1, $16 20@16 50; Ohio Softener No. 2, $15 20@15 50; Jackson Co., Silvery No. 1, $18 00@00 00; Jackson Co. Silvery, No. 2, $17 00@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 25@00 00; Southern Softener No. 1, $15 75@00 00; Southern Softener No. 2, $15 00@00 00; Southern Strong No. 1 Foundry, $16 75@00 00; Southern Strong No. 2 Foundry, $15 75@00 00' Alabama Car Wheel, $19 75@20 75; Hanging Rock Char coal, $21 00@22 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 00@14 25; Southern coke No. 2, $13 25@13 75; Southern coke No. 3, $13 00@13 25; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 00@17 00; Southern charcoal, No. 2, $15 50@16 00; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@12 75; Cold short, $12 25@12 50; Mottled, $11 75@12 00. CAR WHEEL AND MALLEABLE—Southern (standard brands), $18 00@18 50; Southern (other brands), $17 00@17 50; Lake Superior, $19 50@20 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 50@14 75; Southern Coke No. 3, $13 75@14 25; Southern Grey Forge, $13 25@13 50; Southern Charcoal No. 1, $17 25@17 75; Southern Charcoal No. 2, $16 75@1 25; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 00. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $19 50@20 00; Southern, $19 50@20 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $5 65.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $17 00@18 00; Lake Superior (coke) Bessemer, $16 50@17 00; Katahdin (Maine charcoal), $00 00@00 00; Lake Superior Coke, Foundry, all ore, $17 50@18 00; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@14 50; Jackson County (Ohio) Silvery, $18 25@18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 25@14 75; Southern Coke No. 2 Foundry $13 50@13 75; Southern Coke No. 3 Foundry $12 75@13 25; Grey Forge, $12 50@13 00; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $15 75@16 75; Car Wheel, $17 75@19 75.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $15 50@16 00; No. 2 Foundry, $14 50@15 00; Grey Forge, $13 50@13 75; White and Motlled, $13 00@13 25; Warm Blast Charcoal, $18 00@22 00; Cold Blast Charcoal, $22 00@26 00; Bessemer, $15 25@15 75.

MERCHANT IRON AND STEEL.

Flat Bar

1½ to 4 by ⅜ to 1 inch	1 70
4½ to 6 by ⅜ to 1 inch	1 85
1½ to 6 by 1¼ to 2 inch	2 15
1¼ & 1½ by ⅜ to ¼ inch	1 85
1¼ & 1½ by ⅜ to ¼ inch	1 95
⅝, ¾ and ⅞ by ⅜ to ⅝ inch	2 15

Round and Square.

⅜ to 1⅞ inch	1 75
⅜ to 2½ inch	1 95
1¼ to 3¼ inch	2 25
3½ to 4 inch	2 75
4¼ to 4¾ inch	3 25
4¾ to 5 inch	3 45

Ova

⅜ to 1¼ inch	2 15
⅝ to ¾ inch	2 25
⅞	2 55
1	2 95

Half Oval and Half Round.

⅜ to 2 inch	2 85
⅝ to 1¼ inch	2 45
⅞ to 1¼ inch	3 05
1½	3 25
1¾	4 75

Heavy Band.

¼ to 6 by ¼ and 5-16 inch	1 55
¼ to 1¼ by ¼ and 5-16 inch	2 05
⅜ to ⅝ by ¼ and 5-16 inch	2 25
[illegible]	3 75

Hoops.

1¼ to 4, Nos. 13 to 15	2 55
1¼ to 2, Nos. 16 to 18	2 65
1¼ to 2, No. 19	2 75
1¼ to 2, No. 20	2 85
1¼ to 2, No. 21	2 95
1¼ to 2, No. 22	3 05
15-16, 1 and 1⅛, Nos. 13 to 15	2 75
15-16, 1 and 1⅛, Nos. 16 to 18	2 85
15-16, 1 and 1⅛, Nos. 19 and 20	2 95
15-16, 1 and 1⅛, No. 21	3 05
15-16, 1 and 1⅛, No. 22	3 15
⅞, Nos. 13 to 15	2 95
⅞, Nos. 16 to 18	3 05
⅞, Nos. 19 and 20	3 15
⅞, No. 21	3 25
⅞, No. 22	3 35
13-16, Nos. 13 to 15	3 15
13-16, Nos. 16 to 18	3 25
13-16, Nos. 19 and 20	3 35
13-16, No. 21	3 45
13-16, No. 22	3 55
¾, Nos. 13 to 15	3 25
¾, Nos. 16 to 18	3 45
¾, Nos. 19 and 20	3 55
¾, No. 21	3 65
¾, No. 22	3 75
11-16, Nos. 13 to 15	3 55
11-16, Nos. 16 to 18	3 65
11-16, Nos. 19 and 20	3 75
11-16, No. 21	3 85
11-16, No. 22	3 95
⅝, Nos. 13 to 15	3 75
⅝, Nos. 16 to 18	3 95
⅝, Nos. 19 and 20	4 05
⅝, No. 21	4 15
⅝, No. 22	4 25
⅝, No. 23	4 45

Light Band.

1½ to 6 by ½ to 3-16 in	2 20
1½ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by ½ to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅝ and 13-16 by ½ to 3-16 in	2 70
⅝ and 1 3-16 by Nos. 11 and 12	2 80
⅝ and 11-16 by ½ to 3-16 in	3 00
⅝ and 11-16 by Nos. 11 and 12	3 10
⅝ and 9-16 by ½ to 3-16 in	3 30
⅝ and 9-16 by Nos. 11 and 12	3 40
½ by ½ to 3-16 in	3 60
½ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	2 80
⅝ inch, " " " 13 and 14	3 00
⅝ inch, " " " 11 and 12	3 10
⅝ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 45
No. 15 to 17	2 55
No. 18 to 21	2 75
No. 22 to 24	2 85
No. 25 to 26	2 95
No. 27	3 25
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 25
C No. 1, " "	2 40
C H No. 1 " "	2 50
C H Flange, " "	3 50
Extra Flange, "	4 00
Solid Fire Box "	4 75

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 25
Shell	2 50
Flange	2 75
Marine Flange	3 00
Fire Box	4 00

Above includes plates 90 inches wide.

90 to 96 in. wide	⅜c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅜c "
104 to 110 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	08
9-16 to ⅞ in "	08½
7-16 to ⅜ and 2⅜ to 3 in	09
2⅛ to 4 in	09½
⅜ to 11-16 and 4⅜	10
⅞ to 6 in	10½
⅞ to 9-32 and 6⅛ to 7 in	11
5-6 in	13

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅜ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	2 35
Tire	"	2 25
Spring	"	2 80
Sleigh Shoe	"	2 50
Toe Calk	"	2 35
Cutter Shoes, tapered and burr.	"	2 75

English Tool Steel.

Jessop's	15½
Hobson's "Best"	15½ c
" "Choice"	15

Burden Boiler Rivets.

⅜, ½, 11-16 and ⅝ inches diameter	4 00
Bridge ⅜, ½, 11-16 and ⅝ inch diam	4 00

SCRAP IRON AND OLD METAL.

NET TONS

No. 1 R. R. wrought scrap	$18 00
No. 1 wrought scrap	16 50
No. 1 Machine cast scrap	11 50
Iron axles	23 50
Axle turnings	13 50
Wrought turning (free from cast)	11 50
Cast borings	8 00
Uncut wrought iron boilers	11 50
Steel boiler plates	16 00
Grate Bars	8 00
Pipes and flues (Clean)	12 00
Tank iron	12 50
Hoop and band iron	9 50
Sheet iron	8 50
Wrought drillings	11 00
Malleable iron	9 50

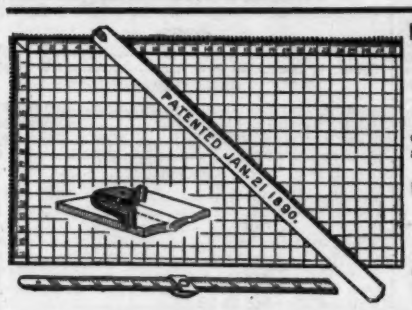
Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	10 00

DIXON'S GRAPHITE PAINT

THOSE who use it say that one pound will cover 2 to 3 times more surface and last 4 to 5 times longer than any lead, mineral or metallic paint. A tin or iron roof well painted will not require repainting for 10 to 15 years.

JOS. DIXON CRUCIBLE CO., Jersey City, N. J



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Cuts any Fraction of an inch by Eights.

Unequaled for accuracy and quick work in cutting square or at any angle. Saves breakages, etc.

—ALSO—

IMPROVED TRAMMEL RULE for Cutting Circles From 3 inches up to 48 inches, Segments, Gothic Shapes etc.

Send for Circular.

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PITTSBURGH & WHEELING COAL CO.,
MINERS AND SHIPPERS OF
Ohio Steam Coal and Coke.
Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.
Office, 6 Mercantile Bank Building, CLEVELAND, OHIO.
Lake Shipping Point, Lorain, O.
JAS. PATTERSON, Sales Agent.

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DEALERS IN
Iron Ore & Pig Iron,
Rooms 716, 717, 718, 719 Perry-Payne Bld'g.
CLEVELAND, O.

OGLEBAY, NORTON & CO.,
Successors to Tuttle, Oglebay & Co.,
Commission Dealers in
Iron - Ores,
FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,
CLEVELAND, OHIO.

J. H. OUTHWAITE. W. G. POLLOCK.
J. H. OUTHWAITE & CO.,
Exclusive attention given to
LAKE SUPERIOR AND MENOMINEE RANGE
Iron Ore,
Perry-Payne B'ld'g. Cleveland, O.

THE CONDIT-FULLER CO.,
Pig and Bar Iron,
CLEVELAND, OHIO.

E. C. POPE,
COMMISSION DEALER IN
Iron Ore, Pig Iron
AND METALS.
Cleveland, - Ohio.

Sam'l. L. Matnet, Prest. & Treas. Fred. A. Morse, Sec'y.
Cleveland Iron Mining Co.,
Dealers in Iron Ores
from their own mines near Marquette, Lake Superior.
Rooms 4 & 5 Mercantile Bank Building,
CLEVELAND O.

BOSTWICK PATENT.

A great saving in mortar, material and labor Write for Catalogue and Sample.
THE BOSTWICK STEEL LATH CO.,
38 Park Row, New York City. Niles, O
Mention this Paper.

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PETER GERLACH & CO.,
MAKERS OF
Saws, Tools and Machinery.
Office and Warerooms, 28 Columbus st. Factories on Columbus, Winter and Leonard streets.
Cleveland, O., U. S. A.

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BANK, RAILROAD
—AND—
OFFICE + FURNITURE.
Interior Work a Specialty.
Send for Illustrated Catalogue.
THE CLEVELAND DESK CO.
97-99 Ontario St., • • Cleveland, Ohio.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 12

Bellows.

Blacksmiths' { Hill's.....dis 40
{ Bullock's.....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single, ...dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 12

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 65

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
6 lb cans, 10 in case	6 c	6½c		5 c
6 lb cans, less than 1	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	2¾	2¼
Hexagon	13½	11½	8¾	6	5¼	3½	3
Washers	9	8	7	5	4½	4⅛	4¼

In lots less than 100 lbs, ₩ lb add ¼c., 1lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30
{ Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 12@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 40

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ½ inch and over.....₩ lb 15½
Sisal, ½ inch and over .....₩ lb 12½

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 50c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 10c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5-25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ Balls	21c@30c	
No. 18 " " ¼ and ½ "	18c@26c	
No. 36 " " ¼ and ½ "	16c@27c	
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine)	11½c	
3-Ply " 1lb Balls	12@12½c	
3-Ply " 1¼ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 6@18...dis 70@10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 6 to 18, market list..dis 70@70& 5
Galvanized Nos. 6 to 18 " " .....dis 65&5
Tinned market Nos. 6 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 12 to 14.....dis 75
Stub's Steel Wire, regular.....$6.00@lb dis 5

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis
William's " " .....dis
Alligator " " .....dis

BLANK BOOKS

Ruled to any pattern.

Best material and workmanship.

CLEVELAND P'T'G & PUB. CO.,

Cleveland, Ohio.

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AMERICAN BRIDGE AND IRON CO.,

Roanoke, - - Va.,

Designers and Builders of

IRON AND STEEL BRIDGES AND VIADUCTS FOR HIGHWAYS AND RAILROADS,

Iron Furnace Plants, Stand Pipes, Mine Car Irons and Wheels,

Also Machinists and Founders. ENGINEERS: C. C. Wentworth and Jos. L. Hunter.

THE STERLING GRATE-BAR COMPANY,

—MANUFACTURERS OF—

The Celebrated Sterling Grate-Bar.

The most economical, the most durable and the easiest of management. Made of cast iron or annealed cast steel, either stationary or with shaking attachment. Prices quoted on all kinds of bars. General offices,

SOCIETY FOR SAVINGS BUILDING, - - CLEVELAND, O.

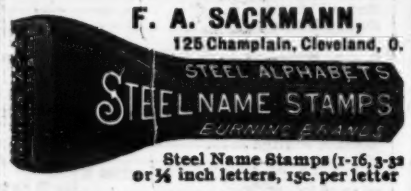
THE THOS. D. WEST FOUNDRY. CO.

CLEVELAND. O.

IRON CASTINGS.

DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.

DUPLICATE WORK A SPECIALTY



F. A. SACKMANN,

125 Champlain, Cleveland, O.

Steel Name Stamps (1-16, 3-32 or ¼ inch letters, 15c. per letter

Chain Belting

OF VARIOUS KINDS.

MALLEABLE, STEEL, WROUGHT AND SPECIAL.

SEND FOR

REDUCED PRICE LIST.

THE JEFFREY MFG. CO.,

143 E. First Ave., Columbus, O.

Chicago Branch, - - 48 So. Canal St.

New York Branch, 15 Cortlandt St.

Eastlake Metallic Shingles.

Unequaled for

ROOFING AND SIDING.

Manufactured by

W. J. BURTON & CO.'s

Galvanized Iron Cornice Works,

Detroit, Mich.

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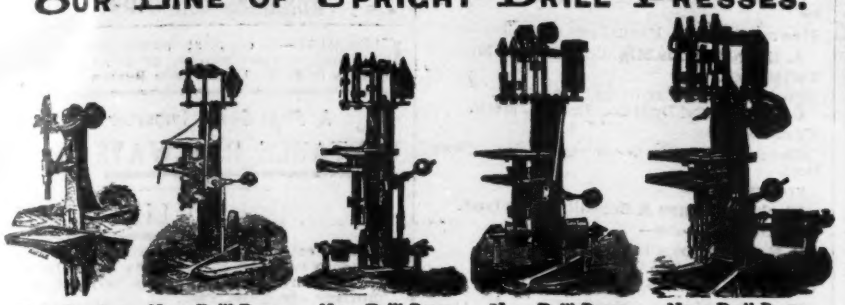

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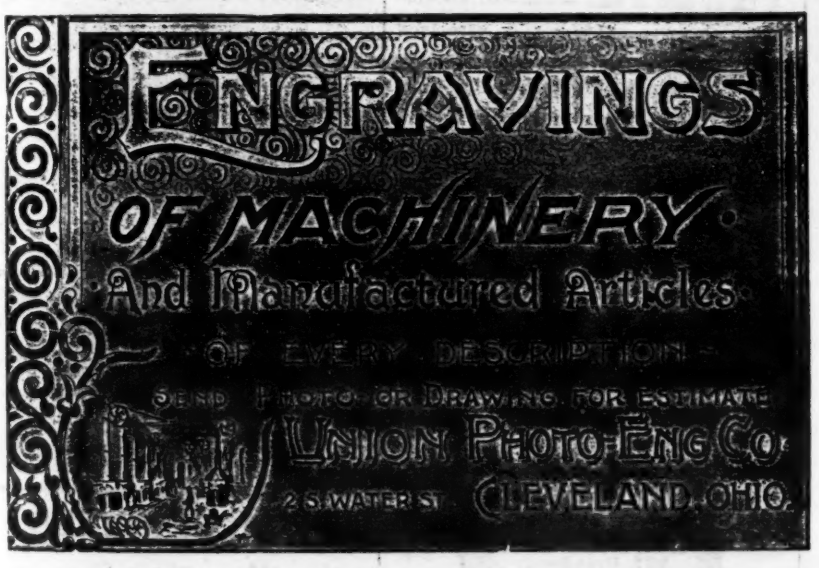

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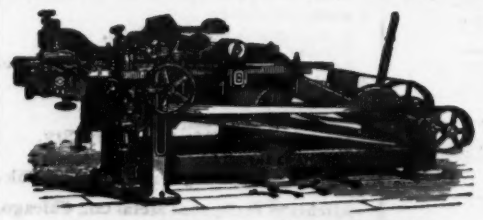

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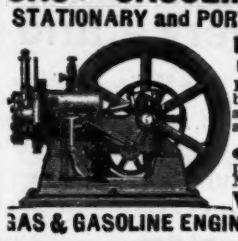
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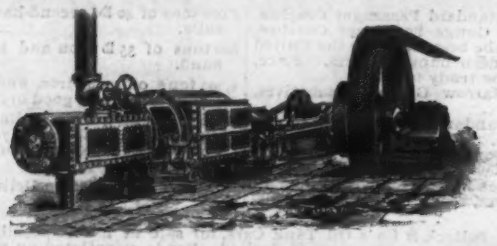

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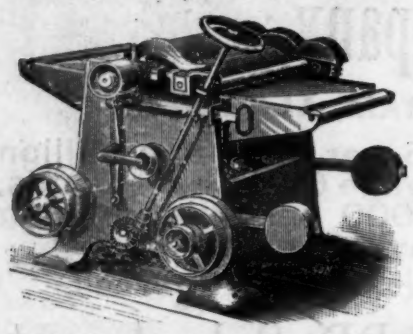

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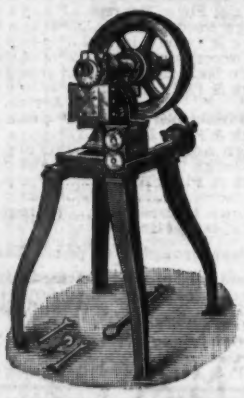

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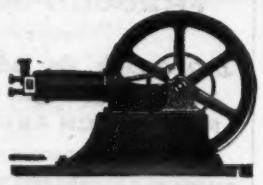

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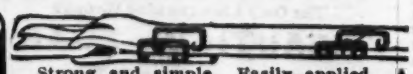

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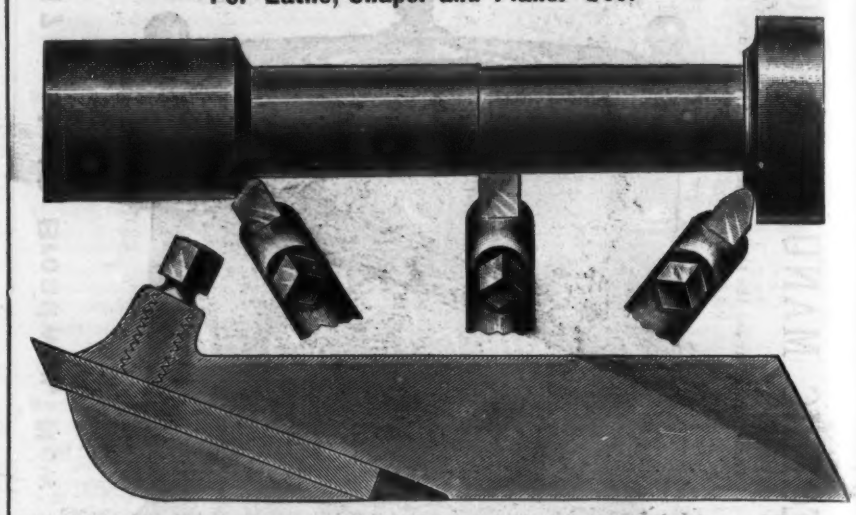

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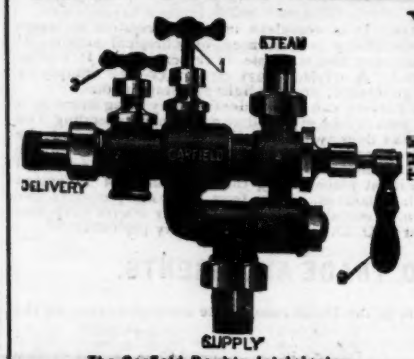

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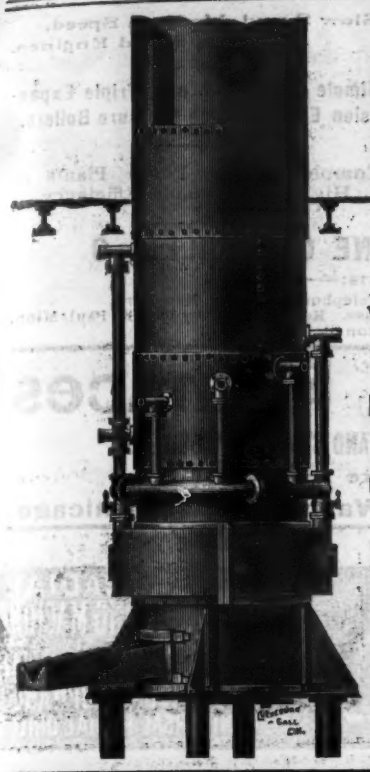

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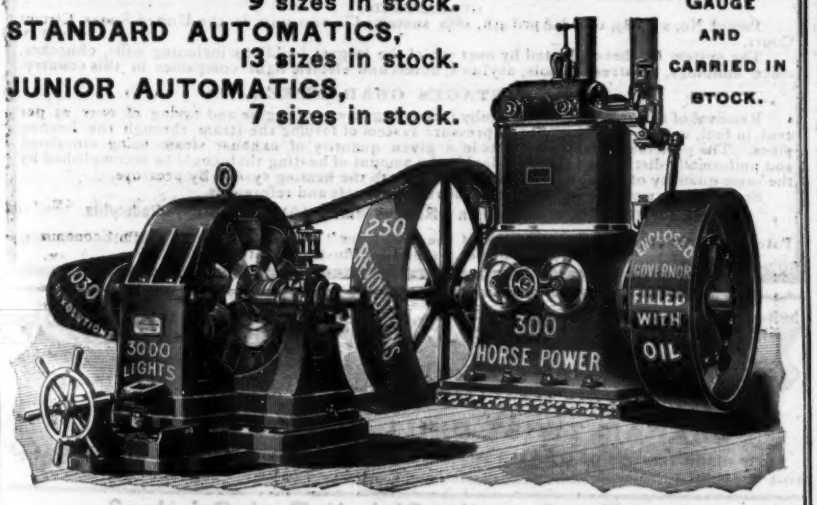

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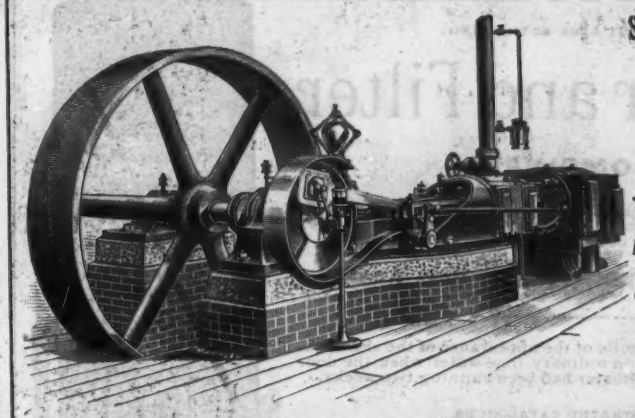

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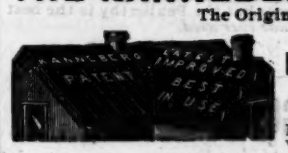

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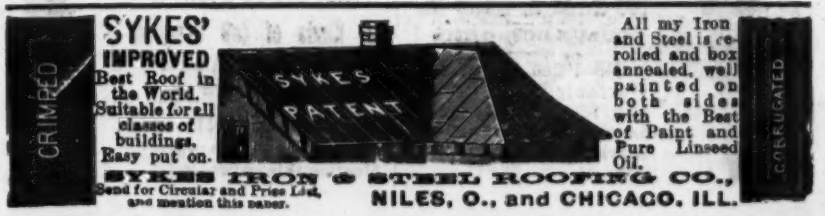
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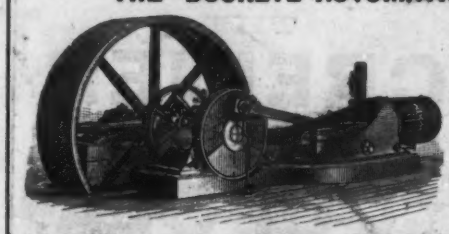

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